DENTAL
UNIVERSITY OF MICHIGAN
DON'T MUTILATE OR
REMOVE

NOVEMBER

THE JOURNAL OF THE NATIONAL DENTAL ASSOCIATION

1921

Cleft Palate and Harelip—*Logan*
Bacterial Invasion of Dental Tissues —*Bodecker*
Mouth Preparation for Full Dentures —*House*
Industrial Dentistry—*Banzhaf*
Dento-Facial Deformities—*Lischer*
Mouth Hygiene Lecture—*Braithwaite*
Tissue Atrophy—*Hall*
Vincent's Infection—*Smeltzer*
Dental Preparedness—*Ireland*
The American College of Dentists —*Johnson*
Commercializing Scientific Knowledge —*Editorial*
The Dental Welfare Foundation —*Editorial*

PROPERTY OF
DENTAL LIBRARY
UNIVERSITY OF MICHIGAN
DON'T MUTILATE OR
REMOVE

TWENTY-FIVE CENTS

CONTENTS

Meeting of the Mississippi State Dental Association, Held at Jackson, April 18-21, 1921, at Which H. E. Friesell, then President, and Otto U. King, Secretary, National Dental Association, Were Honored Guests ..... Frontispiece

ORIGINAL COMMUNICATIONS

Cleft Palate and Harelip.
By William H. G. Logan, M.D., D.D.S., F.A.C.S. 871

Bacterial Invasion and Decalcification of the Dental Tissues: A Preliminary Communication on Recent Investigations of Caries.
By H. W. C. Bodecker, B.S., D.D.S., M.D. 879

Mouth Preparation for Full Dentures from a Surgical and Restorative Viewpoint.
By M. M. House, D.D.S. 891

Industrial Dentistry.
By Henry L. Banzhaf, B.S., D.D.S., F.A.C.D. 901

Dento-Facial Deformities, (Facies Odontolaxia).
By B. E. Lischer, D.D.S. 907

Mouth Hygiene Lecture for High-School Students and Adults.
By Earle S. Braithwaite, D.D.S. 913

Tissue Atrophy Resulting from Compression of Tissues for the Retention of Dentures.
By Rupert E. Hall, D.D.S. 919

Diagnosis, Classification, and Treatment of Vincent's Infection.
By John L. Smeltzer, D.D.S. 924

Dental Preparedness from Medical Department Viewpoint.
By M. W. Ireland, M.D. 933

Educational Ideals in Accordance with the Aspirations of the American College of Dentists.
By C. N. Johnson, M.A., L.D.S., D.D.S., M.D.S., F.A.C.D. 940

Benefits of a Dental Assistants' Society.
By Hedwig A. Kietzmann 944

Radiographic Interpretation.
By Julio Endelman, M.S., D.D.S., F.A.C.D. 945

EDITORIAL DEPARTMENT

Commercializing Scientific Knowledge 947
Commercialism in Dentistry 949
The Dental Welfare Foundation 950
Summary of Dental Welfare Foundation Facts 951
Danger of Public Health Insurance 952

ANNOUNCEMENTS

Calendar of Meetings (National, State, Examining Boards).—Ohio State Dental Society.—Minnesota State Dental Association.—Southwest Missouri District Dental Society.—Board of Dental Examiners of California.—North Carolina State Board of Dental Examiners.—South Dakota State Board of Dental Examiners.—Nebraska State Board of Dental Examiners.—Oklahoma State Board of Dental Examiners.—Rhode Island Board of Registration in Dentistry.—Dental Protective Association of the United States.—American Society of Dental Radiographers.—Dental Corps Orders from War Department.—Patents of Interest to Dentists 953-958

ADVERTISING DEPARTMENT

Index to Guaranteed Advertisements A-69
Classified Section A-64, A-65

Meeting of the Mississippi State Dental Association, Held at Jackson, April 18-21, 1921, at Which H. E. Friesell (1) then President, and Otto U. King (2), Secretary, National Dental Association, Were Honored Guests

THE JOURNAL
OF THE
National Dental Association
VOL. 8 NOVEMBER, 1921 NO. 11

Original Communications

CLEFT PALATE AND HARELIP

By WILLIAM H. G. LOGAN, M.D., D.D.S., F.A.C.S.

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

WHEN an infant presents with a congenital cleft completely dividing the anterior maxillary ridge, hard and soft palate, complicated with either a single or double harelip, one is confronted with the necessity of making the three following decisions:

1. At what age, by preference, should surgical interference be instituted?

2. What part of the deformity should be first corrected?

3. What should be the sequence and dates of the necessary subsequent operations?

I believe the best results will be more uniformly secured in the management of complete cleft of palate with harelip complication when the first operation is performed as soon as the infant has been placed on a proved formula, has regained its birth weight, and is making satisfactory daily physical progress (Fig. 1). These infants, as a rule, can be brought to a condition favorable for operation between the second and eighth weeks of life, when the feeding is carried on under the direction of a specialist in infant feeding. When permitted to arbitrarily set the time for the first operation, I select some date between the fourth and sixth weeks.

The operation to be performed first in the instance of a complete cleft of palate and harelip with or without projecting premaxillary bones is the closure of the cleft thru the maxillary ridge, and, if advisable to do so, the anterior one-third of the hard palate with a very definite narrowing of the distance between the borders of the cleft straight in from the tuberosities.

The cardinal reasons why congenital defect of the hard palate should be operated upon in early weeks of infancy were first laid down by Brophy (1) in 1885.

Reasons for Conclusions

1. By not operating upon the lip until the approximation of the separated bones in their anterior one-third has been accomplished it is possible to complete the operation with greater ease than would be the case if the lip were closed, and, of greater importance, one is able to construct a more normal floor to the nasal fossa on the afflicted side.

2. Since the nose of a patient with a single harelip and complete cleft palate is not, as a rule, in the median line, and can more positively be brought into its normal position and retained there by

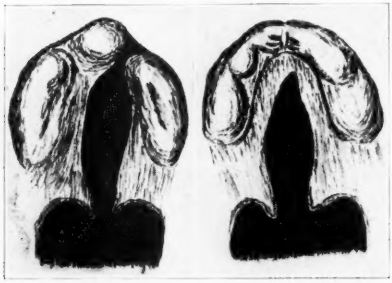


Fig. 1 Fig. 2

Figs. 1, 2—Fig. 1, diagram of complete congenital cleft of hard and soft palate and anterior alveolar ridge on left side. Fig. 2, diagram outlining the degree to which the deformity shown in Fig. 1 is usually corrected by the first operation as outlined in the text.

bending the long side of the bone toward the fissure, at the same time pressing it backward to overcome the usual labial prominence that practically always obtains, one can, by operating during the period when the bones will bend, carry the center of the nose into the median line and there fix it.

3. A more harmonious alveolar outline and bone facial support can be secured when the separated bone portions of the jaw are placed in their proper position in the first few weeks of life.

4. By operating in early infancy, both jaw and facial development will be more symmetrical than would be the case if these bones, soft tissue, and muscles were not brought into full functional activity until some years after birth.

I believe the contention has been justly made by advocates of the early operation for correction of cleft palate that if the child is to be expected to appear and speak normally, the abnormality should be overcome before the infant begins to speak. Give the child a normal functioning palate at the age when it begins to articulate, and it can with greater justification be expected to speak as other children do who are born with these parts normal.

The sequence and relative dates of the necessary subsequent operations after closing the cleft in the anterior third of the palate are as follows. In from six to eight weeks after the hard palate is closed the harelip operation should be performed, and the closure of the soft palate postponed until the child is fourteen to twenty months of age (Fig. 2). An earnest plea is made to have the pre- and postmedical treatment of these infants under the charge of a pediatrician, for if the surgeon makes it a rule never to operate on one of these infants until it is pronounced physically fit by a specialist, his percentage of mortalities would be exceedingly low. My records show a more serious reaction and higher percentage of fatalities following lip than palate operations.

General Consideration of Technic

To bring the separated bones of a complete cleft of the hard palate at their anterior one-third into apposition, and there retain them until union occurs, calls for the application of force at given points and on fixed lines and retention with materials that will withstand the strain necessary to bring these separated bones in contact without undue irritation for from four to six weeks. The procedure and materials as advocated for the Brophy operation of hard palate are here recorded because when made use of

as employed by him they will give a higher percentage of success than any other technic. The materials used to bring the bones into apposition are silver wire and lead plates and are placed as follows:

Two double silver wires, gauge No. 20, are passed thru the buccal surface, one posterior and the other anterior to the malar process at the height at which the tissues of the cheek join the jaw, which carries the silver wires above the hard palate across the cleft and causes them

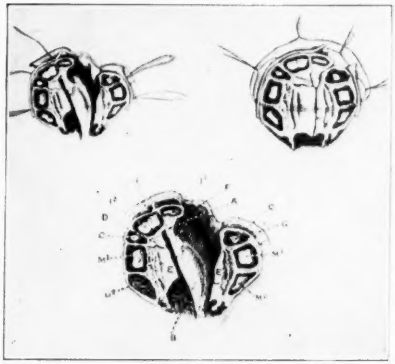


Fig. 3—Shows position of silver wires and lead plates (after Brophy).

to emerge at the same point on the corresponding maxilla (Fig. 3). One of the double wires of the anterior two is withdrawn thru its opening in the maxillary bone on the long side until it can be picked up in the center of the cleft and fastened to a double pilot silk suture, which has been previously placed thru the anterior portion of the maxillary bone on the long side; then by traction upon the silk suture the attached silver wire is carried thru the anterior opening in the long side of the bone. Upon these are threaded lead plates gauge Nos. 12 to 16, varying in thickness with the width of the cleft and the age of the patient. The thicker lead is only made use of in extreme clefts in older children.

After the plates are adjusted to the buccal contour of the jaws, the separated bones are forced together by thumb and finger pressure and the distance gained is maintained by twisting the slack in the wires. By twisting and delaying a little between periods, the alveolar process can be brought in contact as well as the anterior part of the hard palate without injury to the soft tissues beneath the plates. As a guide to the rapidity with which these tissues may be carried in contact, constant observation is made so that the soft tissues do not become unduly blanched or the blood supply interrupted for too long a period. If the operator will keep in mind that the separated bones of the jaw are to be forced together by thumb and finger pressure, and that the silver wires and lead plates are only utilized for the purpose of holding the parts in their new position as they are being carried forward and for the purpose of fixation until union occurs, destruction of tissue beneath the plates will not result from pressure necrosis.

Before fixing the tissue in apposition at the anterior part of the cleft, the bone is exposed along the line where contact is ultimately to occur, the soft tissues reflected back, and the dense surface of the bone removed, so that cancellous bone will come in contact with cancellous bone when fixation is completed. The reflected periosteum from the part on the labial and palatal surfaces is sutured with Equisetene, a skin suture material presented to the profession by Dr. E. H. Ochsner (4), or horsehair. Special care is to be taken in the construction of the lead plates and in the turning down of the ends of the twisted wires so that no sharp points remain to irritate the tongue or tissues of the cheek or lips. All sutures and lead plates are removed in from four to six weeks.

Having re-established, in so far as is possible to do so, the normal outline of the alveolar process and the anterior one-third of the hard palate at a time when the bones can be bent and to some degree

molded into their proper position, and having overcome the deviation of the nose from the opposite side of the cleft by permanently fixing it in the center of the face, the stage has been reached when with justification the lip and defective nostril can be reconstructed with the knowledge that there is not to be a shifting of the underlying bone support (Figs. 4 and 5). I believe all plastic surgeons will agree that it is not so difficult to reconstruct a harelip complicated with a broad spreading nostril (to a lip of proper length and thickness, normal in expression in repose or when speaking or laughing, with a harmony of outline of the affected nostril), when operating over an underlying bone that is relatively normal, as it is to produce similar results over a framework that must undergo constant change for many months thereafter, for the cleft is narrowed in its anterior part by the normal action of the muscles of the reconstructed lip.

Fig. 4 Fig. 5

Figs. 4, 5—Fig. 4, complete cleft of palate and lip on left side with broad spreading nostril. Fig. 5, front and side views of patient shown in Fig. 4 after surgical correction of hard palate, lip, and nostril.

Technic for Closure of Complete Single Harelip with Broad Spreading Nostril

The first step, after a thoro cleaning of the tissues with green soap followed with ether, is to free the lip and broad spreading nostril from their bony attachment by liberal incisions carried close to the periosteum extending from the attachment of the bony ridge at the outer surface of the affected nostril upward and outward to a degree over the facial and buccal surface of the maxilla to a point that will permit of bringing the separated surfaces of the divided lip into apposition without tension. Special attention should be given to the thoro removal of all binding restrictions that interfere with the rolling in of the spreading nostril to a point where a symmetry of outline of the two nostrils is secured. This is held to be basic and should be accomplished, in so far as the tissue will permit, before paring the edges or making the necessary flaps. After the freeing of the tissues on both sides have been accomplished, the surfaces are held in contact to determine at which point they can be brought into position to the best advantage, and form a good thick base for the posterior inferior wall of the new nostril; then the mucous membrane and thin border of the skin forming the line of contact are excised and the superior suture placed and held in position with a surgeon's friction knot.

After the formation of the nostril and the general outline of the nose have been

completed and placed temporarily in its final position, it becomes necessary to study the tissues available for correction of the harelip. Before deciding upon the exact technic, the thickness of tissue and the variation of angle of the long and short side of the lip with the mandible closed and the lower lip in its normal position must be observed so that a correct decision may be reached as to the amount of tissue required to make the upper lip meet the lower naturally. Altho most experienced surgeons successfully determine the length of lip and cut their flaps accordingly without taking measurements, it is my habit in every instance to use calipers and measure from the friction knot previously placed in the nostril to the lower lip (Figs. 6 and 7). Then I adjust the measuring instrument until I believe I have sufficient length of skin and mucous membrane to give the patient a normal outline of lip in the line of union after contraction occurs. With the calipers set at the length necessary for the lip to be produced, one prong is held in the center of the friction knot within the nostril and the lip is marked at the point where the other prong touches the skin and mucous membrane; the general outline and extent of the flaps are gently traced on the skin on both the long and short sides. The outline I follow is based upon the combined principles laid down by Rose, Ladd and Thompson and is recommended because the average surgeon will be assisted in getting a uniform length of incision on both the long and short sides with more certainty than if he depends upon his eye for exact length and direction for the formation of the flaps (Fig. 8).

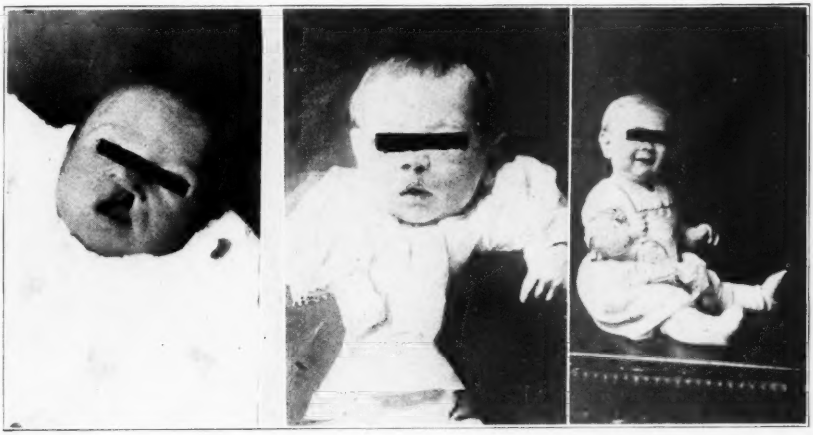


Fig. 6 A B

Fig. 7

Figs. 6, 7—Fig. 6, infant with complete cleft of palate and lip. Fig. 7, cleft of hard palate closed at two months of age, lip six weeks later. A, taken the day sutures were removed from lip, B, one year of age. Compare result with width of cleft in Fig. 6.

When the flaps are completed and the hemorrhage controlled, the lower suture in the skin is placed at just a line or two above the vermilion border engaging all the tissues of the lip except the mucous membrane on the oral side. If a rather free hemorrhage comes thru either suture opening in the skin, it is to be

withdrawn and placed at another point, for the circulation must not be interfered with by retaining a suture in even the smallest twig of a vessel. With the first suture within the nose and the second at the vermilion border which is positively in alignment, the intervening sutures on the external surface of the lip are placed at appropriate intervals to give nice coaptation and smoothness of skin. If the lip is particularly thin thruout, it is everted and the tissues divided to make a wider line of union, thereby thickening the tissue in the part. The mucous membrane is next brought into contact with sufficient coaptation sutures in the prolabium and for the full length of the incision on the mouth side.

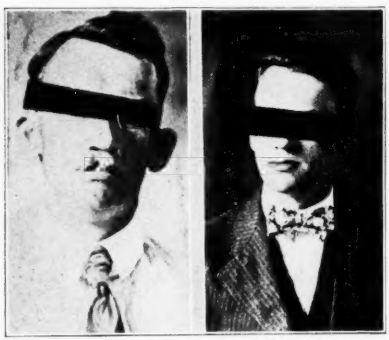


Fig. 8—Result obtained by surgical correction of harelip for an adult by technic described.

For the past two years, I have used the finest Equisetene suture material instead of horsehair in harelip operations, and it is my opinion at this time that it has advantages which make it worthy of a trial by plastic surgeons (Figs. 9 and 10).

With all sutures in position, the line of incision from within the nostril thru the skin and prolabium is cleaned with ether, permitted to dry and sealed with concentrated benzoin solution, as recommended by Dr. E. H. Ochsner (5). If one will apply just a thin film of the benzoin to seal the suture openings and the line of incision, but not enough to obstruct future observation or the field, so that one may detect infection at its onset, should it occur, I believe no danger will accompany its use, and pronounced benefits will be derived by doing away with the necessity of all after-care of the line of incision on its labial aspect and by preventing the liability of subsequent infection from an external source.

Having freely undercut the tissues so that they can be brought in contact without tension and having sutured them in their proper relation, the surgeon is then confronted with the necessity of maintaining this apposition without strain upon the sutures and line of union for a period of a week or ten days when the infant crys or takes nourishment. Many devices have been successfully utilized for this purpose, but since the majority of those with which I am acquainted either interfere with the free movement of the lower lip and mandible or, what is of more importance, cause constant pressure upon the blood supply to the upper lip at a point a short distance from the line of incision, I have been endeavoring for some time to create an appliance that would overcome these objectionable features and yet keep the upper lip free from movement during the healing process without any interference to the normal circulation of blood thru these tissues during this critical period. Figure 11 shows the front and side views of my latest traction bow, preference being given the single bar, C, as the most universal in its application. I have recently been experimenting with a modification of the adhesive straps made of Canton flannel. The tension straps are made adherent to the tissues of the cheek with 10 per cent solution of celluloid in acetone. From the Cunningham (2) experiments sufficient evidence is presented to prove its adherent and nonirritating properties; and I am pleased to report

that no irritation has resulted from its application to the skin of the face of these infants to relieve wound tension following harelip operation. However, I am not entirely satisfied with the duration of the adhesive properties, for in some instances it has ceased to be effective in four or five days, but since the solution of celluloid and acetone does not let the tissue draw away under tension, as does adhesive plaster, I will continue the use of this solution in varied strengths with the hope that it will remain placed on the face for at least seven to ten days under tension. The tension straps are not removed for a week or ten days, the sutures on the labial surface of the lip in from five to eight days, and those on the posterior surface of the lip, from two to four days later. Figure 12 illustrates my traction bow and tension straps as applied in actual practice.

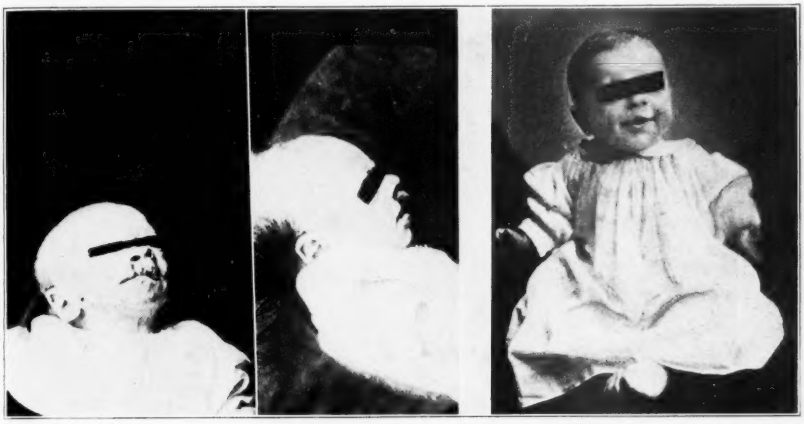


Fig. 9 Fig. 10

Figs. 9, 10—Fig. 9, front and side views of infant with congenital cleft of soft and hard palate and of lip, extending to outer angle of right nostril. Hard palate operated upon at three months of age, lip and nostril two months later. Fig. 10, same as Fig. 9 after surgical correction of hard palate and lip.

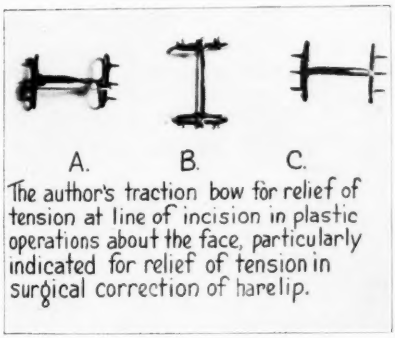

A.
B.
C.
The author's traction bow for relief of tension at line of incision in plastic operations about the face, particularly indicated for relief of tension in surgical correction of harelip.

Fig. 11

It is possible in most cases to successfully produce a soft palate of proper length, free from excessive scar tissue, providing the case should be operated at all, without making broad lateral incisions, if the proper use of tension sutures and buttons of either lead (after Brophy) or silver (as described by Federspiel) (3) to relieve traction from the coaptation sutures is made.

SUMMARY

1. A child presenting with complete congenital cleft of hard palate and lip should be operated on as soon as it regains its birth weight, and is making satisfactory daily physical progress.

2. Pre- and postmedical care should be attended to by a pediatrician.

3. Patients presenting with complete congenital cleft of the hard palate and lip should have the defect in the alveolar ridge and anterior one-third of the palate closed first. (The only exception made to this statement is in those cases where there is such a marked degree of deficiency in the bony parts that to bring them into contact would occlude the nasal fossa on that side.)

4. Harelip to be closed in from four to eight weeks after the date of hard palate operation.

5. If the case is complicated with protruding premaxillary bones, these should never be excised, but always retained and placed in position to be made an intricate part of the jaw, as they contain the germs of the superior deciduous and permanent incisors and form a necessary support to the upper lip (Fig. 13).

6. When separated bones are brought into position, the dense surface is removed so that a bony union may be secured.

7. Excessive tension upon the lead plates is to be avoided.

8. In reforming a broad spreading nostril or lip, free undercutting is demanded to permit of securing apposition without tension.

9. The employment of Equisetene in the lip instead of horsehair and the sealing of the line of incision upon the labial aspect with liquid benzoin evaporated to a syrupy consistency and the application of the traction bow and tension straps of adhesive plaster or Canton flannel to the tissues of cheek and face with celluloid and acetone solution is recommended.

Fig. 12—Side and front views of the author's single bar traction bow in position.

Fig. 13—Side and front views of patient with pronounced protrusion of premaxillary bones with normal hard and soft palate thruout with the exception of the anterior alveolar ridge.

BIBLIOGRAPHY

1. BROPHY, T. W. *Oral Surgery.*

2. CUNNINGHAM, W. F. *Jour. Amer. Med. Assoc.*, Vol. 73, No. 13.

3. FEDERSPIEL, M. N. *Surgery, Gynecology and Obstetrics,* November, 1918.

4. OCHSNER, E. H. *Illinois Med. Jour.*, April, 1920.

5. OCHSNER, E. H. *Illinois Med. Jour*, April, 1920.

BACTERIAL INVASION AND DECALCIFICATION OF THE DENTAL TISSUES: A PRELIMINARY COMMUNICATION ON RECENT INVESTIGATIONS OF CARIES

By H. W. C. BODECKER, B.S., D.D.S., M.D., Berlin

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

THE acid produced by the fermentation of carbohydrate food particles in the oral cavity, has, since the researches of W. D. Miller, been regarded as the chief factor in the phenomenon of caries. All subsequent investigations have been based upon this assumption, and have, therefore, been confined to the conditions of the mouth which favor fermentation. In the light of our present knowledge, there can be no doubt that the acid responsible for the decalcification in caries is produced by micro-organisms. The fermentation theory, as at present accepted, does not, to my mind, give a satisfactory explanation as to the place and manner of the formation of the acid that actually dissolves the lime salts of the dental tissues.

In discussing this subject, I wish to confine myself entirely to the phenomenon of caries, and to leave the question of etiology, vital resistance, etc., for future consideration.

According to the fermentation theory, particles of carbohydrate food retained in the mouth undergo fermentation which results in the formation of acid. This acid is supposed to attack the enamel, and in the later stages of the disease to diffuse into the dentin to the point where the solution of the lime salts takes place; the organic structures, after decalcification, are destroyed by saprophytic micro-organisms. This theory cannot, however, give a satisfactory explanation for all the phenomena observed by the practitioner or by the microscopist.

The first questions that arise in considering this theory are, how strong an acid can be produced under the most favorable conditions, and what is its radius of action? In regard to the first point, Miller says: "The greatest amount of acid which I have as yet observed in lactic acid fermentation is 75 per cent." To account for the decalcification which takes place in caries, this amount appears remarkably small, if we consider the fact that the acid is expected to diffuse some distance thru other solutions, or thru substances containing moisture. Long before reaching the point where decalcification is supposed to take place, the strength of the acid would have fallen to a small fraction of 1 per cent, that is, to such an extent as to have become practically inert.

To more clearly illustrate the objections that can be raised against the acid

diffusion theory, I will consider several phenomena of dental caries with which every practitioner is well acquainted.

Leathery dentin.—This tissue, if we may still call it so, is composed of the greater part of the organic structures of the dentin. It contains large quantities of moisture and, according to Miller, 26 per cent of lime salts. In order to reach the undecalcified dentin, the acid must diffuse thru the entire layer of this leathery dentin. In passing thru the outer zone, it encounters the products resulting from the decomposition of the basis substance by the saprophytic microorganisms. These products are invariably basic in nature and therefore must neutralize at least part of the acid. In the deeper layers the acid is further diluted by the moisture contained in the leathery dentin. However, the question most difficult to explain from a physicochemical standpoint is, Why should the acid pass thru a tissue containing 26 per cent of lime salts without combining with these, in order to reach the lime salts contained in the more remote, newly infected dentin? To accomplish this, the acid would have to leave a tissue still containing a comparatively large amount of lime salts, to pass along the dentinal canaliculi, and to penetrate the acid resisting Neumann's sheath, in order to attack the same salts that it had refused to dissolve in the beginning.

Penetrating caries also proves to be difficult of explanation, as the acid would have to remain inert until it reached the deeper layers of the dentin. The same is true of secondary caries under leaky fillings. We should naturally expect the acid to decalcify the walls of the channel along which it penetrates from the surface, between the filling and the dentin. In practice everyone has seen numerous cases in which the dentin along the margin was healthy, while the secondary decay was confined to the deeper parts of the cavity, often directly over the pulp.

Fissure caries, also, is an inexplicable phenomenon, if we assume that the acid is formed in the sulci of the tooth. The acid would have to act in the unnatural manner of refusing to unite with the salts lying in its immediate neighborhood in the enamel and in the outer layer of the dentin, in order to reach remote points along the dentin-enamel border.

These facts alone would be sufficient to shake our confidence in the acid diffusion theory, even if observations of recent investigators did not tend in the same direction. Eckermann was unable to affect carious dentin with a 2 per cent solution of lactic acid, and says further: "As a matter of fact, lactic acid does very little harm to living teeth, altho in vitro it produces a superficial erosion of dental enamel free from saliva." This would prove that the lactic acid formed in the mouth, which can only reach the area of advancing caries in a greatly diluted state, would have but slight power of decalcification.

In writing upon the etiology of caries, Pickerill states: "There is a popular saying that 'nature abhors a vacuum'; it might also be said: 'Nature abhors a free acid,' for neither can exist *naturally.* The acid seeks a base to combine with *immediately* after it is formed." In regard to the action of lactic acid the same author says: "Both Head's and the writer's experiments show that lactic acid will sooner combine with a salivary salt than with the calcium of the enamel, and that when the former combination has occurred—even tho there still exists a slight acid reaction (to litmus)—no effect will be produced on a normal enamel surface. It is also equally obvious that if acid is formed in proximity to a tooth and a sufficiency of alkaline saliva is not at hand to satisfy it, it

must *at once* combine with whatever other base is available, and this, as a rule, is found in the lime salts of the enamel surface, and a cavity is initiated."

In applying the above to the acid diffusion theory, the question arises, Why should the acid in the beginning of caries "*at once* combine with whatever base is available," while later during the process the same acid is supposed to wander long distances before combining with a base?

From the foregoing it becomes evident that the weak acid formed by the fermentation of food particles in the oral cavity, on reaching the advanced zone of caries by diffusion, (1) would have become so dilute as to be ineffectual as a decalcifying agent; (2) would have to travel a long distance from its place of production, thereby decreasing its power of reaction, which is greatest in statu nascendi; (3) would have acted contrarily to its usual chemical behavior by not combining with the bases in its immediate neighborhood.

If the fact that the decalcifying acid cannot be produced upon the surface of the tooth is admitted, it might still be maintained that the acid is produced by fermentation of food particles, which are by some means brought from the surface to the place where the decalcification is taking place. It soon becomes evident, however, that this theory cannot be accepted, for food particles, or even single starch grains, cannot pass thru a layer of leathery dentin, or along the dentin-enamel border, or into the tubuli of the dentin to the seat of carious activity.

A consideration of all the above-mentioned facts has led me to abandon the theory that decalcification is due to acid formed by the fermentation of carbohydrate foods or to acid saliva. The theory I wish to offer is based upon clinical experience as well as upon observations and experiments of different investigators. Even tho some points must still be substantiated by experimental evidence, I feel confident that the theory is of sufficient interest to warrant my presenting it to your notice in the form of a preliminary communication. I wish again to emphasize the fact that not the etiology but the phenomena of caries as such is to be the subject of my consideration.

As the microscopic conditions presented by caries are familiar to everyone, I need not go into detail. The essential features are the presence of micro-organisms in the organic structures of the tissues attacked and the solution of the lime salts of the infected area. It is self-evident that only micro-organisms can have produced the acid necessary to decalcify the tissues. This acid we may consider, as the result of different investigations, to be, in the main, lactic acid. As already stated, the highest percentage of this acid found by W. D. Miller in his cultures was 75 per cent. An aqueous solution of lactic acid of this strength has, as observed by my brother in his experiments, only a very slight decalcifying power. Eckermann found that in vitro lactic acid (strength of acid solution not stated) in presence of saliva has no effect on dental enamel. This behavior is attributable to the mucin which is present in every saliva and which covers the surfaces of all the tissues in the oral cavity. This film of mucin is present at all points protected from mechanical disturbance. But not only in vitro does this film protect the underlying structures from the action of the acid. Every practitioner knows that the cement lute of an inlay dissolves out only to a slight extent. The explanation given by Grieves, and I believe this to be the correct one, is that the solution of the cement stops as soon as the crevice

is deep enough to retain a film of mucin. As this mucin film is deposited upon every protected surface in the mouth, it must be specially well developed in every cavity and upon the surfaces on which caries is beginning. Is it not contradictory to assume that in caries the acid of fermentation passes freely thru a thick film of mucin to the underlying dentin, while a thinner film of mucin protects the cement lute?

The fact remains, however, that the dental tissues are decalcified by the lactic acid produced by the micro-organisms; and if we examine the conditions under which the acid acts in natural caries, we will perceive that the acid is far more active and more concentrated than that which plays a part in the experiments in vitro. Generated at the point where the decalcification takes place, the acid is in its statu nascendi, a condition in which it exhibits its highest power. Owing to the fact that the dental tissues contain but a small amount of fluid, the acid remains concentrated. Since the mucin of the saliva is not able to reach the point of decalcification, the diffusion of the acid is not interfered with. There can be no doubt that the lactic acid produced by the micro-organisms *at the seat of the disease* can and does decalcify the tissues in dental caries. If we reject the fermentation theory on the ground that acids formed upon the surface of a tooth cannot reach the deeper points where decalcification is taking place, and that fermentation of carbohydrate foodstuffs cannot occur at these points, as they cannot penetrate the tissues, there can be only one explanation for the formation of the acid, namely, that the formation of lactic acid by the micro-organisms can take place only in the presence of *soluble* carbohydrates. Soluble carbohydrates, however, do not result from fermentation, but are the products of normal salivary digestion.

This thought may at first appear very radical, as we have been accustomed to consider fermentation and acid conditions of the mouth almost synonymous with caries. I hope, however, that the facts I have already stated and the explanations I will offer of the phenomena that could not be satisfactorily explained by the fermentation theory, will go far toward proving the truth of my arguments.

In order to explain my theory more easily, I will divide the process of caries into two phenomena, which in the disease occur simultaneously: (1) the invasion of the micro-organisms; (2) the decalcification of the dental tissue.

As the formation of the acid has taken up our attention so far, I will first consider the question of decalcification. At the focus of the disease, the micro-organisms act upon the *predigested* carbohydrates, i. e., the dissolved sugars, and change them into lactic acid. This acid, in statu nascendi, combines with whatever lime salts it finds in its immediate neighborhood, thereby forming a solution of high osmotic tension. This solution, following the laws of osmosis, will diffuse thru the leathery dentin toward the surface. As the acid has been neutralized at the point of its formation, it will in passing outward, not disturb the alkalinity of the putrefactive process taking place in the outer zone of the dentin. On the contrary, the dissolved phosphates may even (according to W. D. Miller) stimulate the growth of micro-organisms. The lime salt solution, in passing thru the leathery dentin, takes up soluble substances which increase the osmotic tension; this increase is, however, slight in comparison to the osmotic tension produced by the mineral salts. Upon reaching the mucin film, which in this case acts as a dialyzing membrane, an osmotic exchange takes place, the lime salts passing out into the oral cavity and the

water of the saliva passing into the infected dentin. This water, however, contains dialyzable products of salivary digestion in the form of sugars of low osmotic tension. This dilute solution of sugars diffuses thru the leathery dentin, being steadily drawn onward, owing to its low osmotic tension, to the points wherever solutions of lime salts with high osmotic tension are being formed. On arriving at the seat of bacterial activity, the sugars serve as nourishment for the micro-organisms, while the water takes up the newly formed lime salts, thereby being increased in osmotic tension and, in its turn, passing out to the surface.

I have previously mentioned several conditions which cannot be satisfactorily accounted for by assuming that dental caries is caused by acids formed in the oral cavity. Can they be explained by the theory that only such acid as is formed at the focus of the disease, plays an active part in the phenomenon of caries?

Under "leaky fillings" we have the following conditions. The narrow opening of the crevice will most certainly be obstructed by a film of mucin, which, as has been already stated, will prevent acid and food particles from entering. I will go even further and state that I doubt whether the micro-organisms can penetrate this mucin film, if it is of any thickness. Predigested carbohydrates, however, can and do pass thru and furnish nourishment to whatever micro-organisms are *already present* under the filling. The position of these micro-organisms determines the point at which secondary caries begins. If they are present in the dentin at the margin, decay will begin there; if present only at the deepest point of the cavity—and the dentinal tubules of even a well-excavated cavity often contain micro-organisms at this place—caries will begin at this point. It may even penetrate to the pulp without attacking the dentin lying nearer the margin. On the other hand, if there are no micro-organisms present in the dentin, it is possible for a filling to become "leaky" without secondary decay occurring.

Before considering penetrating caries and fissure caries, I wish to express my views regarding the invasion of the micro-organisms, as this is an important factor in the explanation of these phenomena. So far, I have considered only two factors in the process of caries: the chemical, i. e., formation and action of acid; and the physical, i. e., diffusion and osmotic tension. These factors alone do not, however, suffice to explain the advance of the disease along certain lines within the tissues. A third factor in the process of caries, which, in my opinion, is the most important, and which so far has not received sufficient attention, is the *vital factor.*

In invading any tissue, micro-organisms which have no movement of their own—and this is the case in carious infection—can progress only by proliferation, or thru the movement of the fluid in which they are suspended. The latter condition does not apply to caries. If the theory of diffusion is correct, large numbers of micro-organisms cannot be carried into the unaffected tissue, as they are situated at the point of highest osmotic tension and the movement of the fluid is consequently from this point to the surface, i.e., to the point of lowest osmotic tension.

Wherever micro-organisms advance by proliferation, they will naturally grow along the path that offers the most suitable nourishment. The micro-organisms of caries require a *mixed nutrient medium,* one containing proteids as well as carbohydrates. This is proved by the cultures in the laboratory as well as by conditions in the mouth.

Undoubtedly there are micro-organisms present under the mucin film covering a cement lute, and soluble carbohydrates can certainly pass thru this film. Still, the micro-organisms do not grow, and no acid is produced, because the cement contains no digestible proteid substance. On the other hand, the dentinal canaliculi under many fillings contain micro-organisms, as has been repeatedly proved. They, too, do not proliferate or produce acid, altho easily digestible proteids are present. They, in their turn, lack that slight amount of soluble carbohydrate nourishment necessary for their growth.

As the result of our microscopical examinations of the dental tissues, my brother and I have found that the micro-organisms of caries advance most rapidly in the organic structures containing protoplasm. The contents of Tomes's fibers—which we consider to be the tubular prolongations of the odontoblasts, having the same contents as these cells, and consisting, therefore, of almost pure protoplasm—offer the richest nutrient medium to the micro-organisms. For this reason, the invasion of Tomes's fiber and the interglobular spaces is more rapid than that of any other part of the dental tisues. The next most favorable medium seems to be present at certain areas of the dentin-enamel border. Neumann's sheaths, the outer layer of Tomes's fibers, i.e., the walls of the odontoblastic processes as well as the interprosmatic structures of the enamel not being protoplasmic in character are but slowly affected.

If we keep in mind the facts just stated, we can readily explain the phenomenon of penetrating caries. If, at the point where the infection of the dentin occurs, the canaliculi are larger than those in the neighborhood, and the organic matter in the dentin-enamel border is comparatively slight, the micro-organisms will proliferate into these larger canaliculi, as they offer more protoplasmic material than the other parts of the tissue affected. More acid will be produced and therefore a more rapid solution of lime salts will take place at this point. The consequent higher osmotic tension will draw more soluble carbohydrates to this point and furnish new nourishment to the micro-organisms. This process will go on until the pulp is reached, *if these canaliculi continue to offer more rich albuminous material than other places in the tissue affected.* Should, however, a new supply of protoplasmic material be invaded nearer the surface—perhaps an interglobular space—and thus a new point of high osmotic tension be formed, the invasion of the canaliculi originally attacked will be retarded or even brought to a standstill; thereby, changing the so-called penetrating caries into the form usually met with.

In this connection, I wish to mention the so-called chronic caries which is characterized by a slow rate of progress. In my opinion, this phenomenon is due solely to the fact that the tissues attacked contain but a small amount of easily digestible organic matter. Relatively few micro-organisms can, therefore, develop; the amount of acid formed will consequently be small, and decalcification will advance but very slowly. If the advancing caries encounters an area in which there is practically no protoplasm present, the micro-organisms can no longer develop, and as a result the formation of acid, and with it the decalcification of the dental tissue, whether it be enamel or dentin, ceases. The condition necessary for the development of such arrested or self-limited caries, are most often found in the enamel, as this tissue contains but a slight amount of easily digestible proteid matter, especi-

ally in its outer layer. In dentin this phenomenon is met with almost exclusively in that variety of this tissue, known as senile dentin. Every practitioner has observed such cases. They have been variously designated as black caries, healed caries, or, as W. D. Miller names them, decay marks.

The zone of invasion in carious dentin, examined under the microscope, shows a very irregular margin. If decalcification were due to acid penetrating from the surface—as assumed by the fermentation theory—the line of advance would be quite regular. This is, however, not the case, even under conditions most favorable for the action of the free acid in the mouth. Sections made of the carious dentin of a freely exposed shallow, cervical cavity, show irregularly distributed funnel-shaped areas of infection, varying greatly in width and in the depth to which they penetrate the dentin. The point of the funnel is invariably formed by one or more infected odontoblastic processes or so-called Tomes's fibers. Each funnel is surrounded by a zone of decalcified dentin, the line of demarcation running symmetrically to the outline of the infected areas. Between these and extending to the free surface exposed to the fluids of the mouth, there are areas of undecalcified dentin with uninfected dentinal canaliculi present. Such conditions cannot be accounted for by the fermentation theory. Furthermore, if we assume that the free acid of the mouth attacks the surfaces of the dentin, the disease would advance by a solution of the lime salts of all of the exposed basis substance, with a subsequent invasion of micro-organisms. Microscopic examination, however, shows the reverse to be true, an invasion of the dentinal canaliculi and a subsequent decalcification of the intermediate basis substance.

From what has been said above, the phenomenon of fissure caries not only becomes explicable, but, in my opinion, it also helps to prove that caries is primarily an infection of the organic structures of the dental tissues. The course of the infection corresponds exactly to the distribution of the uncalcified organic matter as determined by histological examination.

In this connection, I wish to emphasize the necessity of completing our knowledge of the histology of the enamel and dentin, as without this the true explanation of dental caries will never be found. Is it not contrary to reason to try to explain the pathological conditions of a tissue whose histology is not known in detail? This is the case with enamel, the tissue primarily affected by caries. Recent investigations have gone far toward clearing up this question; the outer zone of the enamel, however, has not been, as yet, sufficiently studied in regard to the distribution and nature of the organic matter which it contains. For it is, in my opinion, just this uncalcified organic matter which is most intimately connected with the initial lesion of caries.

The last point to which I wish to call attention briefly is the parallelism existing between dental caries and the infectious diseases. In both cases micro-organisms gain an entrance into the tissues and attack the cellular protoplasm; in caries, the contents of the odontoblastic processes, the interglobular spaces, and the structures along the dentin-enamel margin. The bacterial activity in both cases results in the production of substances deleterious to the tissues infected. In one case, toxins are formed, in the other, acids. Furthermore, the tissue destroyed by the primary disease is subject to reinfection by a different micro-organism, for instance, the mixed infection of tuberculosis, in which the tis-

sue destroyed by the tubercle bacilli is reinfected by pyogenic micro-organisms. To this condition dental caries also presents a parallel, the decalcified tissue being subsequently attacked by saprophytic micro-organisms.

In conclusion, I wish again to call attention to the following facts based upon the investigation of my brother and myself:

1. It is physically and chemically impossible for the acid formed by fermentation of food particles in the mouth to reach the zone of advancing caries in a sufficiently active state to decalcify the tissue.

2. The acid, which dissolves the lime salts, can only be formed by the action of micro-organisms at the point where the decalcification takes place.

3. The growth and activity of these micro-organisms are dependent upon the presence of a mixed nutrient medium, i.e., one containing proteids as well as carbohydrates.

4. The necessary carbohydrates are brought to the seat of infection by osmosis in the form of dissolved sugars. These cannot be produced by fermentation but are the products of normal salivary digestion.

5. The micro-organisms producing caries, not having any movement of their own, must advance by proliferation; the rate of growth being in direct proportion to the richness of the nutrient medium.

6. In dental caries, the micro-organisms always invade the tissues along certain definite lines. Microscopic examination of the dentin has proved that these lines are identical with that part of the uncalcified organic matter which is richest in albumin, i.e., the contents of the odontoblastic processes, the contents of the interglobular spaces and the structures along the dentin-enamel border.

7. What is true of the dentin and of the inner zone of the enamel must also be true of the outer portions of the enamel. Not, however, before the distribution of the uncalcified organic matter in the outer zone has been definitely determined can the initial lesion of caries and with it the etiology of this disease be explained.

8. The many similarities between caries and infectious diseases in general seem to justify the assumption that further investigation will prove dental caries to be an infectious disease.

Further histological research and further bacteriological investigation will undoubtedly furnish an explanation of the initial lesion of dental caries, which will lead to a true and simple solution of the question of etiology. The futility of trying to determine the etiology of a disease before its pathology is known, is proved by a statement made by a well-known author on dental caries, to the effect that after estimating the combinations and permutations of all the factors of dental caries, he finds that in about 3,628,000 cases of caries, no two might have exactly the same combination of causes. I believe, however, that when the true explanation of the etiology is forthcoming, we will be satisfied with less.

Discussion

Weston A. Price, Cleveland, Ohio: I would like to ask if Dr. Bodecker has, with this new information, been able to produce artificial areas of caries?

C. F. Bodecker, Berlin: My brother and I have worked on this subject for only a short time. My brother was led to this conclusion by examining the specimens that I had made for the purpose of studying the dentinal tubules, and we have not as yet made any bacteriological examinations or conducted any experiments along this line, and therefore have not been able to demonstrate that we can produce artificial caries in this manner. But I am absolutely certain that we will throw some light on this subject by producing artificial caries in the laboratory.

Question: Will you kindly explain Tomes's fiber as you understand it, the circulation in the dentin, etc.?

Dr. Bodecker: My idea of the formation of Tomes's fiber is that it is not in the form of a solid fiber but in the form of a tube.

Neumann's sheath incloses the protoplasm of the fiber, which is the prolongation of the odontoblast. After finding that Tomes's fiber was a tube and not a solid fiber, I came to the conclusion that if we would treat the dentin by my special histological method, pyridine under vacuum, to dissolve out all of the protoplasmic fluid in Tomes's fiber, we would have a tube, of which you have seen specimens in cross-sections of dentin, one ring representing Neumann's sheath, and in this ring a second, which represents the tubular process of the odontoblast.

In regard to the circulation in the dentin, I consider that the circulatory fluid passes out from the odontoblast, thru this tubular process of the odontoblast (Tomes's fiber) and carries the nutrient fluid to the basal substance in the dentin. That explains how we can have changes in the dentin. We note that in age the canaliculi become smaller; how would the calcium salts be transported except by these channels? If we admit that a circulation goes out from the pulp to the surface, we have to find some channel which will take these fluids back to the pulp tissue, and as there is a space around the odontoblastic tube, inside of Neumann's sheath, my brother and I have considered this to be the return channel. Up until the present time, nobody has given to Neumann's sheath its full physiological significance. It has simply been seen, demonstrated and recorded, but no one ever considered that it had any function. Neumann's sheath is a condensed basal substance, but chemically it must be somewhat different, because it acts differently under the stains.

Question: Then is it by that process that the enamel of the tooth becomes hard after its first development in a child?

Dr. Bodecker: There are two theories which are advocated as to the hardening of the enamel after eruption. As stated, I have not seen the literature for five years, so I am not able to consider the work of the later authors, but in Germany it is considered (and I do not adhere to this view) that the enamel is hardened by the salivary salts, thru osmosis, by passing thru Nasmyth's membrane. I do not see why we have to find some different mode of metabolism for every tissue of the body. We have circulation in the dentin, and we have organic matter in the enamel, in connection with the pulp. Why should the tooth not continue to calcify and harden thru the original channel of the pulp? What is the function of the pulp? Why should it remain? It is a large organ, it occupies quite an area in a temporary tooth. When the tissues of the tooth have absolutely hardened, in forty to fifty years, the pulp diminishes in size, until it is like a thread.

William Hopkinson, Milwaukee, Wisconsin: I would like a little more clearness in regard to the circulating fluid passing in and out of the dentin. If the so-called odontoblastic processes pass into the dentinal tubules not as processes at all, but as tubular extensions of the odontoblastic cells, what can be the character of this circulating fluid; is it blood or lymph or is it simply hyaloplasm from the odontoblastic cells?

Dr. Bodecker: Probably it is lymph. It contains albumin and calcium salts. The albumin in it is responsible for our regarding Tomes's fiber as solid, because this albuminous fluid is coagulated by the fixing agents we use, therefore in many microscopic specimens, as ordinarily treated, the fiber appears to be solid. Of course, it is not blood, and as Dr. Noyes, in his investigations on the lymphatics of the pulp, has again proved their presence, it is probable that these furnish the nutrient fluid in the dentin.

J. M. Prime, Omaha, Nebraska: How do you view the result to the central artery or nutrient supply of the tooth in the loss of the pulp? What has been your observation of the effect upon the tissues normally nourished thereby?

Dr. Bodecker: I undoubtedly believe that the dentin of the crown and enamel of a pulpless tooth are dead and have no further circulation. The root, as high as the gingiva, receives circulation from the peridental membrane. As yet I have done no experimental work on the cementum. I cannot show you the channels of circulation between the cementum and the dentin, but from clinical experience I believe they exist. A pulpless tooth is decidedly more liable to caries; the crown will break off, the enamel is more friable, and it will soon, in an neglected mouth, crumble down to the edge of the gum. And in that condition, the roots can stay in the mouth for many years, caries advancing slowly from the gingiva, but the sides and walls will stand longest as these are attached to the pericementum and still receive nutrition.

I believe that the change of nutrition of the tooth is one cause of caries. That is the vital factor. Take for instance a case of proximal caries in an upper molar and bicuspid. Why should one proximal surface have a large cavity and the other have only a brown spot? If primary caries is due to local formation of acid from food particles, lodged between the teeth, it should act in all directions, and the acid should therefore attack the enamel of both teeth at the point of contact equally. And it would do so, unless there were a vital

factor which causes the acid to dissolve the more predisposed tooth more easily than the other.

I think you have all known patients that have had little predisposition to caries, and then within, say, six months they have come back with several freshly decayed areas. And in nine cases out of ten examination of the general condition will show that either just previous to or right after such a predisposition to caries, the patient has developed some systemic disturbance.

Question: Do the fibers running thru the dentin convey sensation? Otherwise why is the dentin sensitive?

Dr. Bodecker: We used to think that Tomes's fiber conveyed sensation and nutrition, but in the last ten or twelve years quite a few authors have proved the presence of nerve filaments in the dentin. The reason they have not been proved before is that the microscopical technical methods have not been adequate for demonstration. Now the function of sensation is attributed to the nerve filaments above, and nutrition to the tubular processes of the odontoblasts.

Russel W. Bunting, Ann Arbor, Michigan: I presume Dr. Bodecker knows of the work of Pickerill, which has had a profound bearing on this subject. In some of the work that we have done we have followed Pickerill, and have noticed this: That the enamels of various teeth differ, and they differ especially on their external surface when first erupted and during the subsequent years. We find that the condensation and the perfecting of these enamels is a process taking place after eruption, and that the defects that exist in this structure are on the periphery of the enamel—not seemingly in the deeper or dentinal portions. We have also noted that even in adult life the teeth vary as to their porosity on the periphery, in one mouth they may be very pervious and in another exceedingly impervious. We also find that these differences in the enamel structure are in direct relation to the amount of calcium in the saliva. This conclusion is very similar to that arrived at in the work of Broderick of England several years ago. And we have been able to work this out to a point where we feel certain that there is a relationship, whether coincidental or actual, between the amount of calcium in the saliva and the perfection of the condensation of the enamel.

We have added to this the direct proof that it is possible for salts to permeate the enamel and dentin to the pulp from the saliva inward or from the pulp outward. We have done this in the test-tube, under every precaution, to prove that this is possible. From this viewpoint the condensation of the enamel appears to be a physicochemical phenomenon depending on the salt concentrations of the blood within and the saliva without the tooth.

Dr. E. C. Kirk said many years ago: "It is a strange thing that the organisms which cause dental caries, and which we believe feed upon the carbohydrates of the mouth, should burrow deep in the tissues and grow away from their source nourishment, when all other forms of organic life grow toward their nourishment." Therefore Dr. Bodecker's expression of the correlation between proteins and carbohydrates is a very interesting statement. So also is his suggestion that the bacteria of dental caries may be carried into the dentin by osmotic flow.

I was greatly interested in what Dr. Bodecker said regarding the production of artificial caries. Miller said he produced artificial caries, but I am sure that the more one has worked with this problem the more one doubts that Miller ever did it. He produced artificial decalcification of the tooth, but true caries is something we have never been able to produce except when he had the pull of osmosis. We put a tooth into saliva that was fermenting, covering the whole tooth and leaving a little hole to see if we could produce a cone-shaped entrance into it; and invariably we found that we could only produce a parallel decalcification, which is not characteristic of true caries.

I wish to ask if pulpless teeth are more prone to carious attack than are vital teeth; whether or not caries in pulpless teeth is the same as it is in vital teeth, and whether it does spread more rapidly in the pulpless tooth than in one that has a vital pulp. In such cases we, of course, have entirely eliminated all possibility of true osmosis as a factor in the case. We have been watching for clinical evidence regarding the progress of dental caries in pulpless teeth for some time but as yet have not enough data to be conclusive.

One other factor I wish to mention in regard to the reason why caries is deep-seated rather than superficial. We have, and I know Dr. Bodecker has time and again, made decalcifying solutions and put certain teeth into them, and they would remain there days and months and never be affected, but another group of teeth subjected to the same conditions would decalcify rapidly. So we cannot get away from the type of the individual tooth structure we are working with. Do we not find that deep, penetrating carious lesions are cases in which the enamel is not readily affected by the acids we are dealing with in caries? But if by osmosis that process can be carried into the dentin, the lesion is then operating upon a structure which is more soluble, and it is our experience that those

deep-seated cases are confined to certain types of teeth.

All this brings us back to the question, What is a normal tooth?

Dr. Bodecker: It is my conviction that a pulpless tooth is more liable to caries than a vital one. I do not base my conviction upon laboratory, but upon clinical experience, and I have considered this point for over fifteen years. The pulpless tooth is, to my mind, considerably more affected by caries, in spite of the fact that after it has been well excavated, and the pulp removed and the approximal cavities well extended so that only the labial and lingual walls stand; nevertheless these walls will often fail long before those of adjacent vital teeth.

The structural differences of enamel are undoubtedly caused by a varying percentage of organic and inorganic matter. Several years ago this was absolutely denied, but Pickerill has proved the existence of malacotic and sclerotic enamel. I believe that three factors are concerned in the predisposition to caries: first the vital factor, second the structural, and third, the ratio of organic to inorganic matter.

Vida A. Latham, Chicago: As regards pulpless teeth Dr. Bodecker is right in his statement that the lower third of the tooth, the "root," if we may so term it, to the gingival border, has a better circulation than the enamel ever can have. We must not forget the cause of the loss of pulpless teeth, The loss of that tooth depends a great deal on the difficulty of preventing a chronic inflammation. Those who have extracted the roots of teeth, whether they have been crowned or not, know that there may be a great deal of thickened membrane around them. That membrane, of course, is in a chronic inflammatory condition, which can become subacute. For instance, a pulpless tooth is very comfortable; it has been crowned very nicely, and the patient pays no attention to it, but often, if the immunity declines a little, swelling forms, with a little tenderness, and the patient visits the dentist because the tooth is a little sore to bite on. The dentist applies something, the tooth is comfortable again, and the patient will go along for a time. Histologically what happens? If you take a root like that out, cut it and make a microscopical section, you will find there is an osteoclastic formation going on just as bone is reabsorbed in the process of development. As fast as the osteoblasts build up bone the osteoclasts pull it down. That is why a pulpless tooth becomes so loose that you have to take it out. Sometimes there is a granulomatous tendency or one to malignancy.

As regards circulation, I have had a specimen which showed the circulation of the blood absolutely to the outer layer of the enamel. I also had specimens which demonstrated the nerve filaments passing into the enamel, and I reported a case where one could demonstrate the nerve filaments coming on the outside of the cuspid.

The method of growth of the enamel is another interesting point. Some have had cases of cuspids with an extra point on the distal surface, and patients have had this point ground off because of irritation to the tongue. There must be a proliferation of enamel to produce it. The question arises as to whether enamel grows or not. Miller said it did.

The essayist stated that teeth vary, and they do vary tremendously. I have injected teeth in which I have had beautiful illustrations of circulation right thru into the dentin in loops and into the enamel, but I believe the best injection in every case is at the apex and gingival border. I have slides in which the dentin and the granular layer show the circulation right thru to the alveolar surface, and in some cases the nerve supply runs with it.

Dr. Prime: I want to know if it is true, and if true why we frequently find caries arrested just as it approaches the pulp. It does not appear to me to be a calcific protection from the pulp, but there seems to be some effort in nature to arrest the process at that point, and we find a good, substantial protection between the carious cavity and the dental pulp.

Dr. Bodecker: I believe that in all cases of arrested caries, some condensation of the basal substance of the dentin will be found, building up a wall between the cavity and the pulp and also that the amount of organic matter in the protoplasmic bodies has been reduced and almost eradicated. Therefore, in this case, one of the two factors needed by the micro-organisms of caries for their proliferation (proteid nourishment) is lacking. They may have plenty of carbohydrates from the mouth, but they will not have the proteid material; therefore the process of caries comes to a standstill.

In regard to Nasmyth's membrane, it is true that very little work has been done on this tissue. On the cusps and grinding surfaces it does wear off, but on the labial and buccal surfaces I believe that Nasmyth's membrane may persist for many years or thru life. I think it is a very important subject because it has something to do with the initial lesion of caries.

A. T. Rasmussen, La Crosse, Wisconsin: In connection with the statement that pulpless teeth are destroyed more rapidly by caries

than are teeth with vital pulps, I would like to ask what Dr. Bodecker's experience has been as to just how caries attacks the tooth in these cases. In pulpless teeth there are usually large restorations of metal or some other material. We know that the most vulnerable point of any tooth, whether pulpless or not, is at the junction of the tooth substance and the artificial restoration—in other words, the cavity margin. How have these teeth been attacked in your experience? Has the caries which ultimately destroyed such crowns attacked them at that point, viz., the cavity margin or have they been liable to attack at other points not usually so attacked in vital teeth?

I might say that from my own clinical experience, I do not feel justified in saying that pulpless teeth are more readily attacked by caries than other teeth, in the same mouths, having vital pulps, other conditions being the same. It is possible, of course, that observations made in private practice would be different from those made in a free clinic or similar institution. It would seem, however, that the private patients who are seen regularly for a term of years would be better cases for observation than those who are seen only a few times.

Dr. Bodecker: The most vulnerable part of a tooth, pulpless or not, is at the point of junction of tooth tissue and restoration. But pulpless teeth are usually filled with due regard to that. We have in our textbooks the special warning to extend our fillings up over the cusps to prevent these from being injured by mastication. And even if we do that, they frequently decay. These teeth are more brittle, and the reason lies in the fact that the organic matrix in the enamel of a pulpless tooth has not the binding power; therefore the prisms seem to cleave more easily under the stress of mastication.

A. E. Webster, Toronto: If we accept the theory that the dentin is dead in a pulpless tooth, then there must be some different scheme of decay taking place in the enamel of a tooth that is dead. I cannot agree with men who say that the root of a pulpless tooth is in the same condition as that of a vital tooth. To come back to the crown of this tooth, we heard it stated that when the dentin in the crown is dead the dentin in the root may not be dead, and that this is the reason why the root does not decay. I think it has been shown by some observers that there is a certain anastomosis in dentin which perhaps carries nourishment to the crown, and yet caries would because of vitality the more readily attack it. I do not agree at all that the nonvital tooth does not decay any more rapidly than the vital one. Dr. Bodecker refers to the increased friability of the enamel in pulpless teeth, and everybody here must be familiar with that fact. Why should it be more friable in a pulpless tooth than in the vital tooth, unless there were some degenerative change present?

Dr. Bodecker: We place great weight on the idea that the micro-organisms of caries require a mixed nutrient medium for their proliferation.

MOUTH PREPARATION FOR FULL DENTURES FROM A SURGICAL AND RESTORATIVE VIEWPOINT

By M. M. HOUSE, D.D.S., Indianapolis, Indiana

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

THE operation we have to consider is alveolar resection, following the recent removal of the natural teeth, where the teeth have been periapically or cervically infected. In connection with such an operation three distinct requirements or considerations present themselves: (1) a radiographic diagnosis, (2) certain surgical requirements, the technic of which can be discussed only with reference to the fundamental principles involved, since the necessary procedure cannot possibly be reduced to a mere routine; and (3) the consideration of the arch, ridge, labial, lingual and buccal forms of the case as a foundation for the restorative treatment.

Within this particular field of dentistry, the observations and experiences of the past five years alone have placed before us so many facts worthy of our most serious consideration that a fresh survey of the methods and processes and the fundamental principles involved seems not only useful but imperative. Not that I would criticize or belittle the work or teaching of any who have in the past contributed to this branch of dentistry; it is a comparatively new field, and all early contributions, just because of their pioneering character, must necessarily endure the most severe and thoro tests before it is possible to standardize the principles involved. When I speak of standardization, I refer of course only to fundamentals. Each case presents a different condition; but in order to deal effectively with its individual peculiarities, it is all the more necessary to have available a thoro knowledge of the fundamental principles, and this not only from a surgical point of view but from the restorative standpoint as well.

A

The general *surgical* standards may be briefly summarized as follows: (1) the primary and fundamental requirement of a complete and unbroken chain of asepsis; (2) removal of all tooth roots, granulomata, detached spiculae; (3) thoro curettement of necrotic areas, including the circumferentially necrotic bone; (4) resecting with precision the excessive osseous developments, and the septal and jagged points of process.

B

The standard *restorative* principle must consist of the proper design of ridge form for the aesthetic and efficient adaptation of dentures, and take into account the absorption that may reasonably be expected, at least during the first six months. In each case the things that must be noted as having a bearing upon the form of the arch, the ridge and the amount of absorption, may be brought under the following eight heads:

1. The general systemic health of the patient.

2. The technic used in gaining access for curettement.

3. Amount, location and extent of necrosis.

4. Amount and nature of infection, pyorrhetic cases being the most extreme in resorption and of longer duration.

5. The extent of resection and the care used for the protection and formation of blood clots in the tooth sockets.

6. The age of the patient. The younger the patient the more favorable the restorative possibilities.

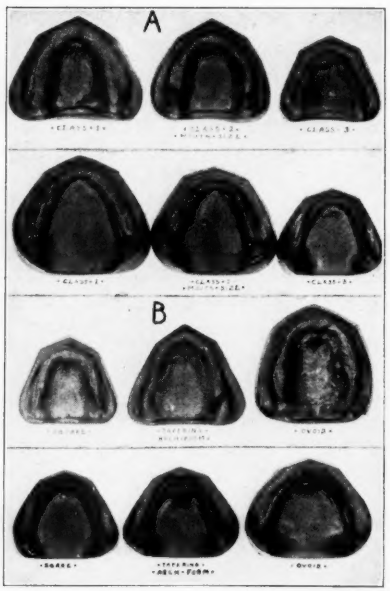


Fig. 1 shows classification: A, maxillary and mandibular size; B, maxillary and mandibular arch form.

7. The nourishment the patient receives following the operation, proper mastication being no small factor.

8. The arch forms and their relation to each other.

1. The first consideration in connection with the design and form of the mouth is the physical size of the bony structure precisely as the edentulous maxilla or mandible is considered and classified for purposes of denture prosthesis. We may recognize roughly three classes: for large, medium, and small structures, respectively (Fig. 1 A).

2. The next consideration should be the form of the arch, whether square, tapering, or ovoid, classes 1, 2 and 3, respectively (Fig. 1 B). The importance of these considerations is further enforced by the fact that a mouth may present a combination of different upper and lower classes, whether with respect to size, arch form or both. In all such cases proper design and preparation will

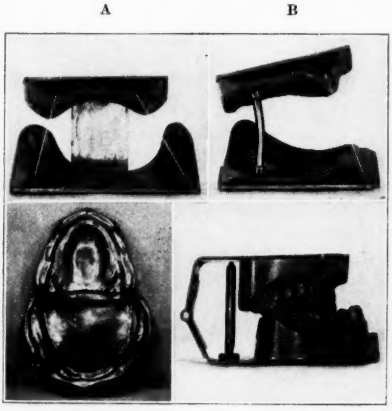
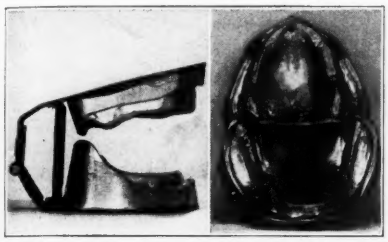


Fig. 2 shows prognathous type: A, cross-section maxillary cast small size, class 3; arch form tapering, class 2; mandibular cast large size, class 1; arch form ovoid, class 3. B, antero-median section showing ridge relation. D, natural dentition or study casts of case before extraction. Resection contra-indicated.

increase very materially the efficiency of the foundation for artificial dentures as regards stability and resistance to leverage. In this connection the operator will need a very thoro knowledge of applied physics, in so far as the theory of the lever is involved.

3. The relation of the two arches to each other should be carefully observed, whether normal, orthognathous or prognathous. In case of under-development of either arch, the matter should be made the subject of careful notation (Figs. 2 and 3).

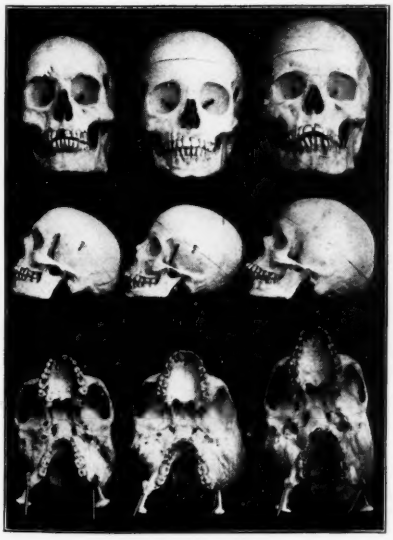
4. After the above-named fundamental matters have been given their due measure of consideration, there should



A B

Fig. 3 shows orthognathous type: Maxillary cast large size, class 1; arch form tapering, class 2; mandibular cast medium size, class 2; arch form tapering, class 2.

come a careful weighing of the aesthetic factors. In order to prepare the mouth form to show as little of the artificial



A B C

Fig. 4 shows three different conditions none of which indicate resection of the labial plate, tho C shows protrusion of the superior centrals and laterals. Occluded study casts are essential for proper diagnosis and design of all abnormal cases.

gum as possible, first observe the length of the lips, the alignment of the teeth in the arch, especially the amount of protrusion and thickness of the alveolar structure and the degree to which the gums are displayed when laughing (Figs. 4 and 5).

5. Of no less importance is the buccal and labial form of the ridges. It is essential that they should be so formed and smoothed that there will be no undercuts or abnormal bony developments acute enough to prevent the comfortable placement of a denture with properly molded muscle and tissue borders.

Fig. 5—A, anteromedian section of maxilla. Note thinness of alveolous and especially the location of anterior palatine canal and foramen. B, Anteromedian section of mandible. Note thinness of alveolous incisor region. C, D, and E, cross-sections of edentulous mandible first molar region after absorption; no resection. Note variation in size, form, also location of external and internal oblique ridges indicating muscle and tissue attachments. C shows good base for denture with buccal and lingual flanges. D, good base for denture with slight flange. E, good base for denture with no possibility of flanges. F, G, cross-sections of mandible first molar region teeth extracted. Note difference in the thickness of the alveolous, also size of the mandible.

Neither should sharp spines or points of process be left to cause soreness from the wearing of a denture.

From still another standpoint it is important to preserve carefully as much of the perpendicular form of these borders as possible. I refer to considerations of adhesions, cohesion, and atmos-

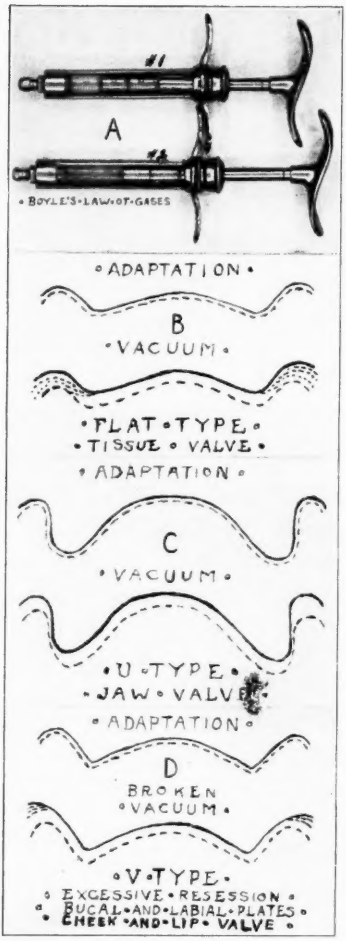


Fig. 6 illustrates Boyle's law of gases. A, syringe No. 1 with plunger set at 10 c.c. when unsealed is to represent one atmosphere of space within which is one atmosphere of gas; syringe No. 2 with plunger drawn from 10 c.c. to 20 c.c. when sealed illustrates two atmospheres of space and one-half atmosphere of gas, thereby creating a rarefaction of the gas or a partial vacuum. The larger the syringe the greater the vacuum illustrative of mouth size. B, C, and D, are drawings made from cross-sections of maxillary casts showing three types of border forms, C, being the best for stabilization of the denture and also for sealing out the ingress of air when the denture is partially displaced under stress. The three types of valves may be present in one case thereby forming an ideal class 1 condition.

pheric pressure. The physical principle known as Boyle's law, that the pressure of a given mass of gas varies inversely as the volume of the space within which it is confined, has an important application in this connection (Fig. 6). The best accounts of this subject which I have read are by George H. Wilson in recent editions of *Wilson's Prosthetic Dentistry* and a paper by Rupert E. Hall of Chicago, in the *Dental Review* of March, 1918, entitled "Retention of Full Dentures."

6. It is also essential to take into consideration the soft tissues, frena, and muscle attachments all of which are extremely important from the restorative point of view.

A. Consider first the tissues that are to form the crest of the ridge or proper bearing surface for the denture. Where the suturing technic has been used, present methods frequently result in two extreme conditions, both unfavorable. The first is the leaving of excessively long tissue flaps, which when sutured form soft rolling tissue ridges, over the thin edges of the palatal plates, thereby causing excessive pressure on the palate and borders of the maxilla and border pressure on the mandible, thus decreasing efficiency of incision and mastication. The other is that of suturing too short flaps, which draw the border tissues, frena and muscles into abnormally close relation to the crest of the ridge, thereby preventing freedom of movement of the lips and causing flat mouth form, V-shaped ridges, and short flange dentures, which will readily be recognized as a very unfavorable condition indeed. When no suturing has been resorted to, we nevertheless often find a correspondingly extreme condition in the cutting away of the labial, buccal, and lingual plates. This results in a mouth form equally bad, but the tissue thickness is usually more uniform. Not even this is true in all cases, however, for when tissues are left, due to faulty technic in

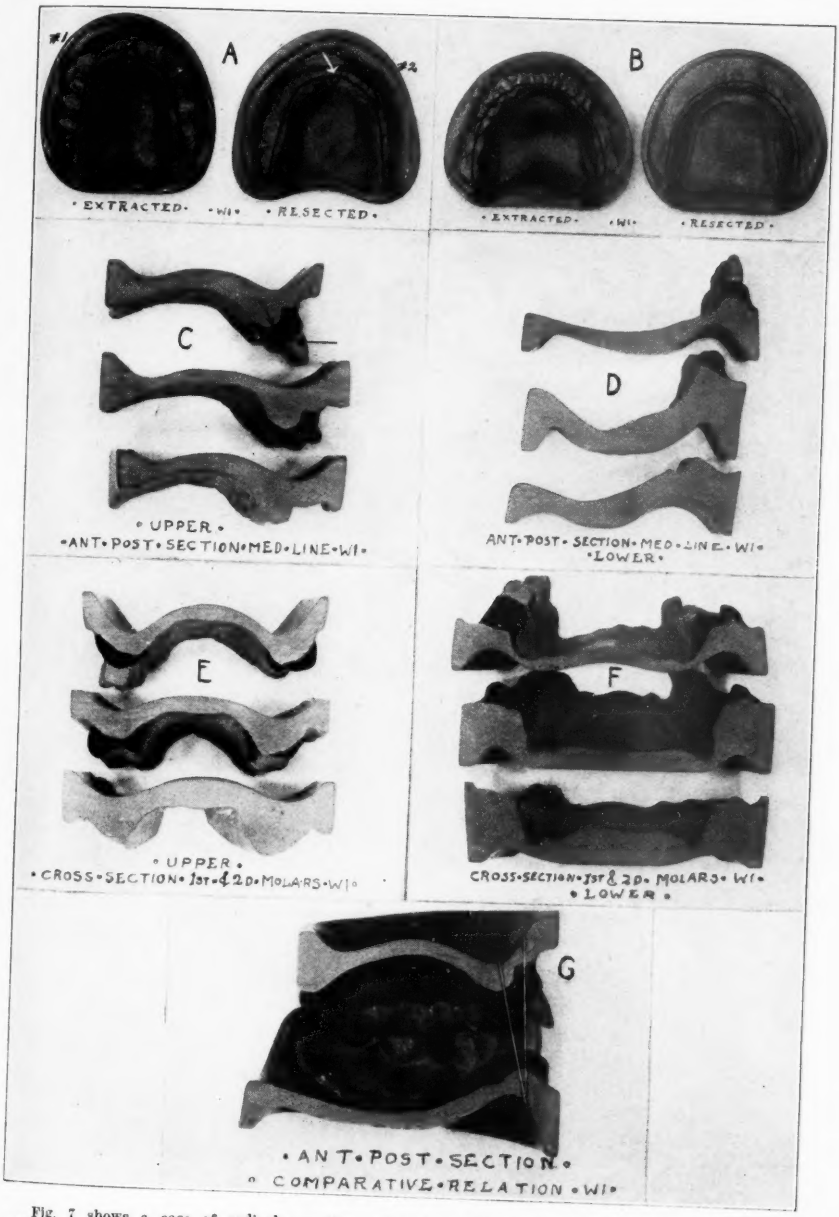

A
B
C
D
E
F
G
• EXTRACTED • • WI • • RESECTED •
• EXTRACTED • • WI • • RESECTED •
• UPPER •
• ANT • POST • SECTION • MED • LINE • WI •
ANT • POST • SECTION • MED • LINE • WI •
• LOWER •
• UPPER •
• CROSS • SECTION • 1ST • & 2D • MOLARS • WI •
CROSS • SECTION • 1ST & 2D • MOLARS • WI •
• LOWER •
• ANT • POST • SECTION •
• COMPARATIVE • RELATION • WI •

Fig. 7 shows a case of radical resection, impressions all taken at the same sitting. Extensive pathology in upper right lateral region only. In A, note reduction in the size of arch (cast No. 2). Nasopalatine nerve and blood supply are in the center of the ridge (indicated by arrow). In C, dark area shows amount resected. Note change in the center of the crest of the ridge (indicated by arrow). In E, note amount resected to get sufficient tissue flaps for suturing. G, anteromedian section. Note change from normal ridge relations to prognathous type. Extreme case of surgical deformity for life, impossible to restore artificially.

trimming the tissue margins and the portions forming the interseptal gum, excessive unattached papillae are formed, which interfere seriously with the comfortable wearing of the denture.

B. Consider in the second place (and this is a matter of vital importance) the palatial nerve and blood supply of the soft tissues. Excessive resection of the labial plate and the smoothing of the margin of the palatial plate frequently leave the anterior palatine foramen directly in the center of the crest of the ridge, especially after absorption has taken place. This is due to the fact that absorption of the labial and buccal plates of the maxilla is much more extensive than that of the palatal plates, whereas the labial buccal and lingual plates of the alveolus of the mandible absorb equally, due to their uniform thickness and blood supply. The result is that the arch of the upper jaw decreases in size, while that of the lower jaw increases. Excessive resection of the palatal plates in the molar and bicuspid regions is fraught with no little danger, because of the presence of the posterior foramen and groove in this region for the protection of the nerve and blood supply. For the protection of the nasopalatine nerve and blood supply, nature has provided the raphe and rugae. These considerations show how necessary is a thoro knowledge of the anatomy, location and proper preparation of each case, for protection of the same from undue pressure under dentures.

The lingual alveolar process should never be resected but merely smoothed or trimmed slightly at its interseptal aspects in order to relieve the spines of osseous protrusion between the approximating teeth. It is very true that upon the prosthodontist lies the responsibility for locating these points of entry for the nerves and the vascular supply and that he should provide for their proper relief when constructing the denture. But I have in my experience found a number of cases where this is exceedingly difficult of accomplishment, due to excessive resection, which removes the osseous protection and makes for constant presure under the dentures. This condition prevents a normal circulation of the blood, creates an unbearable burning sensation in the tissues, causes a rapid osseous resorption, and if not relieved, produces in a very short time hypertrophy of the soft tissues, which means inefficient mastication (Fig. 7 A, Fig. 8 A).

7. The ideal preparation is to preserve all the sound plates of bone that do not form excessive undercuts or sharp spines, taking into consideration also the aesthetic features of the case, especially when there is a short lip. Perpendicular or slightly undercut labial and buccal borders, with smooth ridges, are the ideal. In cases of large areas of osseous destruction at the apices of the roots and extending beyond them, requiring a great amount of curettement, it is practical to raise a buccal or labial flap of tissue, and cut an opening thru the osseous plate, in order to give direct access to the neurotic area; in such cases this is the procedure of choice. It permits leaving a sufficient arch of bone near the cervical margin to allow for the formation and protection of a blood clot in the socket for the regeneration of bone (Fig. 9).

An impression may be taken twelve days after the operation, and the points of raised plaster where the sockets have not completely filled in can be scraped down to proper rounded form for the ideal ridge. When the denture is completed and placed in the mouth, a partial vacuum is formed where these points have been scraped from the impression, and the newly formed tissues in the sockets are drawn down into perfect adaptation to the plate, thereby forming a smooth ideal ridge (Fig. 8 E).

The standards of remuneration now prevailing in the profession of dentistry are such as to justify the devotion of proper care and adequate time for a

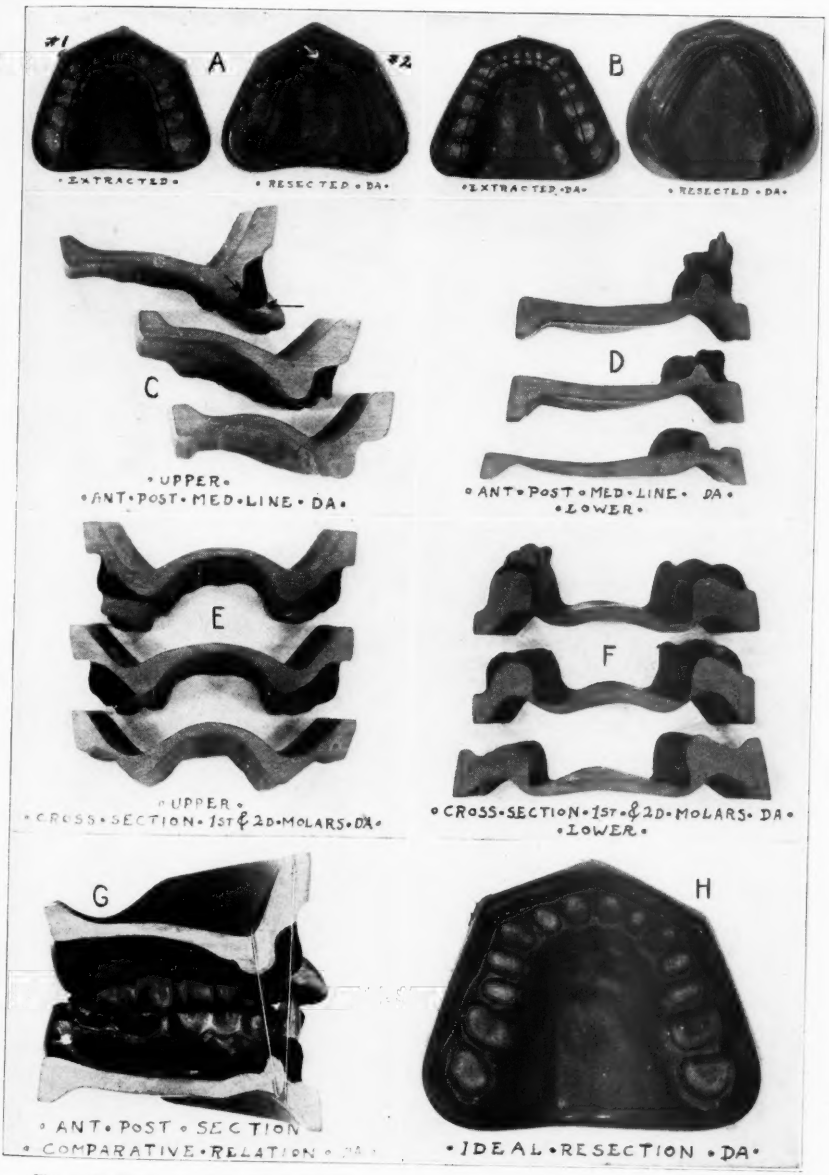

#1
A
#2
• EXTRACTED •
• RESECTED • DA •
B
• EXTRACTED • DA •
• RESECTED • DA •
C
• UPPER •
• ANT • POST • MED • LINE • DA •
D
• ANT • POST • MED • LINE • DA •
• LOWER •
E
• UPPER •
• CROSS • SECTION • 1ST & 2D • MOLARS • DA •
F
• CROSS • SECTION • 1ST & 2D • MOLARS • DA •
• LOWER •
G
• ANT • POST • SECTION
• COMPARATIVE • RELATION • DA •
H
• IDEAL • RESECTION • DA •

Fig. 8—Radical resection. Note carefully the same points as in Fig. 7.

thoro preparation of all cases. There should be a thoughtful consideration of all phases of each case for no routine procedure can furnish a satisfactory solu-

accurate and minute diagnosis, for which study models of the patient's mouth before the teeth were extracted are used, together with carefully tabulated radiolog-

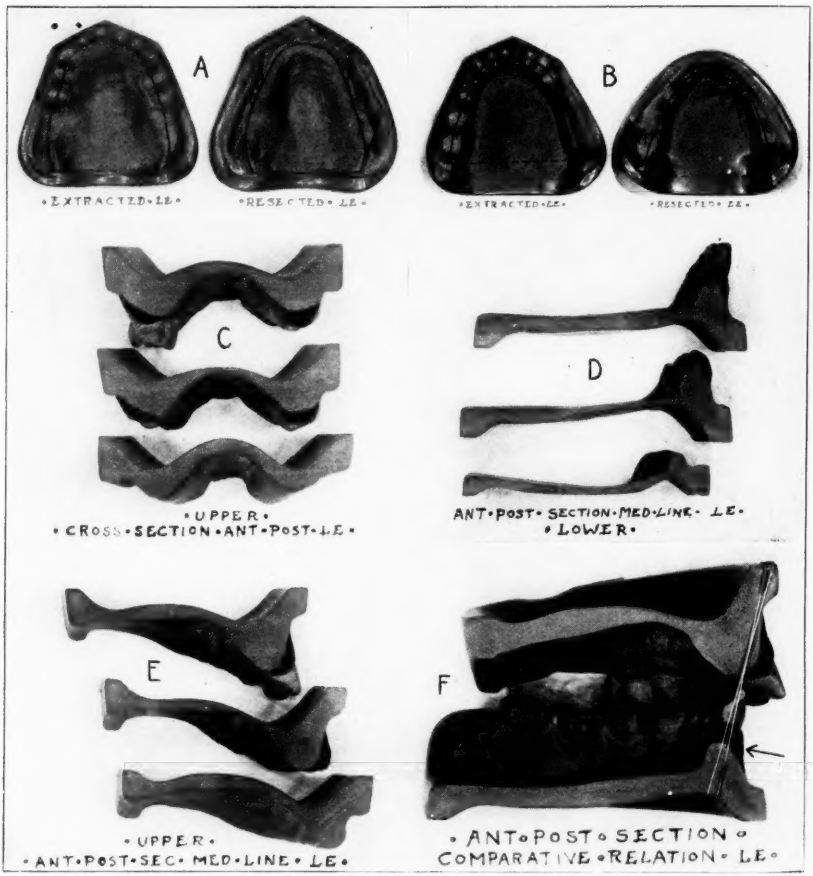

A
B
C
D
E
F
• EXTRACTED • LE •
• RESECTED • LE •
• UPPER •
• CROSS • SECTION • ANT • POST • LE •
ANT • POST • SECTION • MED • LINE • LE •
• LOWER •
• UPPER •
• ANT • POST • SEC • MED • LINE • LE •
• ANT • POST • SECTION •
COMPARATIVE • RELATION • LE •

Fig. 9—Upper protrusion, short lip case, etc. Note slight amount of resection required to make an ideal condition. In F, note slight change in ridge relation; mandibular resection slightly more than necessary.

tion, but every case must be considered on its individual merits. In any event, it is clear that surgical intervention should be based only on the most careful study of mouth conditions, including an

ical findings. Upon the basis of such a study it will be possible to plan a careful surgical procedure for the ultimate welfare of the patient who is to wear the dentures, both from a practical and an

aesthetic standpoint. Incidentally, such a procedure will also be a boon to the prosthetist, tho it goes without saying that the interests of the patient are predominant and decisive.

The phase of our work described here in this paper has already passed the experimental stage. There are individual cases where suturing is advisable, while at other times excessive preparation would be required to make suturing possible. Too many operators seem to have adopted suturing as a routine procedure, having considered the matter solely from the surgical standpoint, to the exclusion of the restorative considerations involved. Hence my plea is for a careful, thoro, conscientious self-preparation, thru study and observation, before embarking farther upon this adventure, so full of risks for the patient and of pitfalls for the dentist. The more remote considerations of what will happen when the patient is handicapped thru the soft food and soup diet forced upon him by surgical deformity and loose plates, to say nothing of social and physical embarrassment, are no less vital to the patient and the profession than the immediate surgical considerations which have hitherto received too exclusive an attention. In this day of specialties we need to be especially on our guard against isolating ourselves from the collateral branches of our art. If the Roman orator could say that all the arts are bound to one another by a common chain, how much truer is this of the various modern ramifications of the single art of dentistry. The ultimate consequences of all the professional specialties center in the patient and are united in him, and in justice to those who place themselves under our care it is necessary to remember that we are still dependent upon one another.

Discussion

Chalmers J. Lyons, Ann Arbor, Michigan: I wish to say that this is a most timely paper. There never was an operation originated in either medicine or dentistry that has been so abused as this operation that we elect to call alveolar resection. The thing that appealed to me in Dr. House's paper was the fact that he lays much emphasis on the welfare of the patient. That is something that has not been done in the past. I firmly believe that many operations of alveolar resection have been done simply because it could be classed as a surgical operation.

One thing that has not been studied in this operation and which should be more carefully looked into is the fundamental principles of surgical repair. Unless we know the principles of surgical repair we have no right to perform so extensive an operation as that of alveolar resection. And in the study of these principles we must take into consideration the formation of the cicatricial tissue; we must try to operate so as to restore normal conditions in the mouth; otherwise the prosthodontist will have no opportunity of doing his work as it should be done.

Dr. House says: "I should standardize the surgical process as primary and fundamental requirements of a complete and unbroken chain of asepsis, removal of all tooth roots, granulomata and detached spiculae and thoro curettement of necrotic areas." It is possible in many of these cases to go too far. We must look upon these necrotic areas as conditions similar to the condition of osteolyelitis, and in some of these cases I believe the best that we can do is to remove the gross infection. It is not possible for any man, even tho he has his tissues exposed in full view, to know when he has removed all of the necrotic tissue, and when he has removed all of the infection.

Among the several things that is necessary to take into account in each case (a point that Dr. House makes, and it is a good one) is that of the age of the patient. We all know that the older the patient, the much less rapid is the repair of bone. Even tho we realize that in the mouth we have a fine blood supply, at the same time in the repair of bone there is a condition existing in the aged that makes such repair very slow.

In many of these cases the operation is one bordering upon major surgery, and I believe that rest for the patient will be a big factor in the process of repair. Do not send your patients home and expect them to do the things that they have been doing in the past.

The essayist has described most beautifully the ideal requirements of post-operative results. Closer co-operation between the exodontist and the prosthodontist is absolutely necessary if we are to expect the best results.

The diagnosis of the case will play a very important part in the procedure. Study models, radiograms and attention to facial expressions are all necessary to success.

I am very glad that Dr. House brought out the point of leaving the lingual alveolar proc-

ess alone, or nearly so. The lingual alveolar process is a heavy plate of bone, and usually there is very little resorption from that plate Furthermore, we cannot take any chances on the impingement of sensory nerves or interference with the blood supply.

Relative to suturing each case represents different conditions. There are many cases that cannot be sutured, and there are many cases that it will be absolutely necessary to suture to secure the best results. Therefore it is necessary to diagnose the case. Dental diagnosis has been weak in the past. And in this particular operation it is more necessary than in any other to study the case and make the diagnosis first. If a surgical operation is necessary, perform it with the least amount of shock to the patient, and the least amount of traumatism to the tissues

Boyd S. Gardner, Rochester, Minnesota: The essayist has demonstrated to us that it is an easy matter to remove too much process and that without a doubt many mouths have been ruined by such a procedure. He emphasized the necessity of full mouth radiograms and the use of study models. I am sure that any operator can benefit by the use of both. In all the cases which Dr. House has demonstrated the teeth have been extracted first and then the process treated afterward. In our work we reverse this procedure; the process is removed before teeth are extracted. By laying back the soft tissues one is able to make a study that will enable him to proceed much better than when the teeth are first extracted. By removing the process, which is directly buccal or labial to the teeth in question or doing what is now termed an alveolotomy, we find that we are able to extract the teeth with a minimum of trauma and certainly we are very much concerned in so doing when the patient's resistance is low. Not only are we able to extract the teeth with a minimum of trauma but we are able to remove all of the teeth rather than leave the apices. This open view operation also enables the operator to remove the pathologic condition and he is able to visualize his work in such a way that it spells the best results for the patient.

I believe that our work is a great deal like that of the industrial surgeon. When he amputates a leg on account of a severe injury and has in mind that the patient must wear an artificial leg, he amputates primarily to eliminate the injured foot, yet he works in such a way as to leave the stump in a condition that the patient will receive the maximum results of the artificial leg in the minimum of time. So it is in the work that the oral surgeon is called to perform. The teeth are to be extracted with a minimum of trauma, pathologic conditions removed and the process left in such a way that the greatest good is to be received from the denture. Dr. House has also emphasized the importance of asepsis in our work and too much emphasis cannot be put on same. That many cases have been oversutured there is no question. Suturing in the hands of many dentists is a new procedure. I have observed many cases where the process has been sacrificed in order to approximate the soft tissues by sutures and this is not necessary. During the past year we have made use of what we term a trial suture which has worked out very satisfactorily. In our hands the interrupted catgut suture has been the suture of choice and we start by placing one suture in the midline and after tying the first knot we retract the lip to such an extent as to ascertain whether we are shortening the lip line. In other words are we pulling in the soft tissues at the expense of a good fitting plate? Many times one cannot approximate the tissues and there is no harm when this is impossible; while on the other hand, in a very few instances one has surplus soft tissue to remove. A few interrupted sutures appear to be all that is necessary and their early removal no doubt is indicated.

In cutting away process, the use of narrow sharp chisels enables us to minimize our trauma and leaves the process in a much better condition than is left by the rongeur. On one hand you have traumatized the process left; on the other hand with the chisel the process is left in a much better condition. We do not encourage the use of files or stones and by so doing adhere more closely to well-established surgical principles.

While there should be an attempt made to standardize this operation, yet as both Drs. Lyons and House have emphasized, we can never say that a certain technic will fit all of our patients. Study the case carefully, make use of study models and co-operate with the prosthodontist. Do the work in such a manner that all pathologic conditions will be eliminated, all root tips as well as all roots removed and finally dismiss your patient in such a condition as will enable him to get the greatest amount of good from his denture.

INDUSTRIAL DENTISTRY

By HENRY L. BANZHAF, B.S., D.D.S., F.A.C.D., Milwaukee, Wisconsin

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

A FEW years ago typhus raged in one of the Balkan states. Men, women, and children were stricken down by the fatal disease. The death roll mounted to thousands and tens of thousands, if not into the hundreds of thousands, and the appalling death-rate was due to ignorance. It was due to the fact that the people were too ignorant to use proper precautions in the care of the sick and in the burial of the dead. We in America cannot understand such infatuated ignorance. We in America cannot understand how a people does not take proper precautions to safeguard public health. We are too highly educated, too far advanced in culture and intelligence to premit such crime against the public welfare; and yet, right here in America, 80 per cent of our people, four-fifths of our population, are menacing the health of the other fifth and of themselves because they do not and will not exercise the proper prophylaxis of their mouths and of their teeth. This is the ignorance of America, of educated America. Every man and woman with any experience in public health work or in educational work knows this.

One of the greatest, if not the greatest, questions which we have to solve is not how to care for the people who come to us for treatment, but is, as Dr. Milberry pointed out to us in New Orleans two years ago, how to get this 80 per cent of our population to come to us for care—to make this 80 per cent realize that a clean mouth is necessary for a healthy body.

These people are ignorant. Ignorance is overcome by education. The education which is necessary in this matter deals with two very different kinds of human material, the one, plastic and impressionable, the other fixed and set—the one kind the child, and the other the adult.

It is not within the province of this paper to consider the education of the child. This is by far the more important problem of the two, and when it is solved the other will, in a large measure, disappear. It may, however, be merely mentioned here that this problem is far from being solved. Dr. Fones has pointed out a method of following the child thru the grades by making oral hygiene a regular part of the school curriculum and by providing for regular attention by the dental hygienist. Before the Fones plan can be applied generally in this country many years will pass, because in order to work it out many tens of thousands of dental hygienists must be trained. Besides, the dental profession must be rapidly augmented in numbers, a possibility which has been postponed for at least four or five years because, by raising the entrance requirements to one year of arts and science college work, some schools have made it more difficult for young men to enter the profession. After we have the hygienists, and after we have more dentists to

direct and supplement the work of the hygienists in the schools, there seems to be no reason why Dr. Fones's idea, which is working out so well at Bridgeport, cannot be applied with general success at some time in the future. If this plan works as well as it should, it will eventually take care of the problem of child education.

The other problem, the education of the adult, we will continue to face until years after the Fones plan begins to be applied generally. I desire to admit at once that all that we, as a profession, can do here is to scratch the surface. If we can succeed during the next ten years in reducing the 80 per cent to 70 or 60, we will have secured results beyond my expectation. The adult American is fixed in his ways. It requires an immense amount of incitement to induce him to take care of his health.

The matter of ethical advertising should and can be settled by the profession immediately. Organizations, such as county and city dental societies, should draft suitable advertisements and articles on the care of the teeth, or copy some of the admirable ones written by the late Dr. William W. Belcher in oral hygiene, insert them in newspapers and periodicals which are read by the masses, and keep up the advertising from year to year. One or two advertisements will not accomplish the results. Old-fashioned advertising will not solve the problem. Vital health truths must be given to the people with a directness that the average person can understand, or we can expect no results. Ethical advertising in the hands of organizations of ethical dentists, members of the National Dental Association, is obviously one way of bringing the truths of dentistry to the masses.

Education of the 80 per cent, therefore, is one of the problems to which the profession must give its immediate attention. Another problem, just as important and immediate, is the cost of the dental service that must be offered to the 80 per cent. The cost of good dentistry must, in some way, be reduced so that the average worker can afford to buy dental service. Something must be done to charge smaller fees for better dentistry, and at the same time to give a satisfactory competence to the denitst. It cannot be denied that if the fees necessarily charged for good dentistry today could be lowered, more people would be able to avail themselves of dental service, and the 80 per cent could be reduced materially.

It is this last problem that I propose to discuss, and I feel qualified to do so thru my personal experience in the Milwaukee Industrial Dental Clinic. This is a clinic which was organized in order to give the best possible dental service at the least possible cost to the employees of some of the industrial concerns at Milwaukee, and at the same time to give to the dentists who were associated in the venture a return for their services equal to the profits made in ordinary practice. More clinics similar to this one will undoubtedly be organized in the future, and for that reason the organization and the results of this clinic may prove of interest.

The plan was first thought of by the youngest member of those associated with him in dental practice. The clinic was organized in the spring of 1920. Previous to its organization, a number of the largest concerns of the city had equipped their plants with dental chairs and had employed young dentists to take care of the dental work of the employees at the plants. Only a few, if any, of these attempts were successful. All of them have long been abandoned here in Milwaukee. There are several reasons why this system of giving the employees dental service by means of the ordinary industrial dental office proved to be a failure:

1. The company felt that it could not afford to pay the salary required by an experienced dentist. The dentist em-

ployed was generally just out of college and considered that his position was only of a temporary nature.

2. If the company gave this service without charge, or made but a nominal charge, the young dentist was soon overwhelmed with work and found that he could not cope with the situation. Careless work or a resignation was the inevitable result. The officers of the company invariably balked at employing the necessary four or five dentists.

3. If the company made a reasonable charge for this work the employees looked upon the whole proceeding with suspicion and only a few patronized the clinic.

4. Welfare workers and welfare departments are looked upon with distrust by the average worker. The dentist's position was worse because when he was placed in this category by the company he was often regarded unfavorably. The average worker considers medical examination of any kind an infringement upon his liberties. To quote the late Dr. A. H. Stevenson of New York: "Anything that savors of paternalism is justly resented by the worker and is an infringement upon personal privilege and independence."

5. The company usually looked upon the clinic from the point of view of dollars and cents only. It was an added feature by which employees could be kept and attracted during the days when labor was scarce. When the war orders stopped much of the enthusiasm for the factory dental clinic disappeared.

Because the dental clinic in the factory building seemed to be a failure, at least here in Milwaukee, the few employers who gave the matter any thought at all, looked to the new Milwaukee Industrial Dental Clinic to fill the want. The activities of the clinic were planned to be four in number:

1. Education by talks on the necessity of clean mouths.

2. Education by means of anonymous printed pamphlets written in popular style.

3. Education of the children of workers by means of entertainments on Saturday mornings.

4. The maintenance of a large dental office centrally located where good honest dentistry would be done for the lowest posible fees.

The clinic rented five thousand feet of floor space in a building which has a downtown location, but where the cost for rent is not as high as is the cost in more modern buildings. The office consists of twelve operating rooms, a surgical room, an X-ray room, a prosthetic room, and all necessary modern equipment. The office furnishings are plain. The office is arranged, and all equipment was bought, with economy and efficiency in mind, because, while the best possible dentistry was to be given, the success of the venture depended upon the ability to charge low fees.

Four large industrial concerns gave their consent to allow the clinic to work among their employees. The system that was adopted is as follows: The clinic establishes a dental chair and other necessary equipment at the factory. Notices are posted in the factory to the effect that the dentist from the clinic will be at the factory during certain hours each day. The concern allows an employee to leave his work for a short time without deduction of pay for the purpose of visiting the dentist. The clinic dentist limits his work in the factory building to two lines of activity: (1) the alleviation of pain; (2) the examination of mouths and drawing of mouth charts. The examination service is paid for by the industries. In the instance of small plants the examinations are made without charge.

Every patient upon leaving the dentist's factory office is given a chart showing the condition of his teeth and his needs for dental attention. He can take this to the dentist in his neighborhood

or he can take it to the offices of the clinic. In the great majority of cases these cards are not brought to the clinic. It is hoped that a decent proportion of charts find their way into the hands of other dentists, because while the dentist is charting the mouth he gives each one of his patients a talk on the relationship of a clean mouth to a healthy body, and does not dismiss the patient until he has given him some pamphlets written in popular style on the evils of unclean mouths.

The pamphlets printed by the clinic are five in number. Two of them are intended for children of eight years, one for children of twelve or fourteen, and two for adults. In writing the pamphlets it was kept in mind that the book education of the average worker does not go much beyond that of an eighth-grade student. The pamphlets in no place give any indication of who had printed them; that is, the clinic does not advertise its name or location on the pamphlets. Those written for the children are given to the patients who say, during their conversation with the dentist, that they are associated with children at home, either as parents, brothers or sisters.

It was intended also to give out the pamphlets to children every Saturday morning. Parents were invited to bring their children to an entertainment provided in the clinic rooms every Saturday morning at ten o'clock. Games were played. During the course of the morning the teacher who had charge instructed the children how to brush their teeth. Brushes and tooth powder were given away by the clinic. Occasionally motion pictures were shown. Despite the fact that this educational activity was in charge of a very competent woman who understood children and was popular with children, it did not prove to be a success. It attracted few children because the clinic was not situated in a residence section. It was difficult to interest parents in the movement because the clinic, without violating the ethical code, could not advertise the Saturday meetings extensively enough.

The clinic is gradually working toward success in its most important object, namely, to care for the needs of the empolyees for as small a fee as possible, and at the same time to do nothing but good dentistry. There are several reasons why the fees in the clinic may be smaller than in other offices. In the first place, overhead expenses, office rent, office maintenance, etc., are comparatively small. A competent woman has charge of the business details, a dental hygienist performs prophylaxis, a nurse looks after the sterilization and assists with the administration of anesthetics, two young girls serve as dental assistants, dividing their time between the various operators, a maid keeps all the rooms clean and bright. Besides the saving of expense afforded by this organization, there is still a greater saving from the fact that in the clinic the men do their own laboratory work, X-ray work, exodontia, and each one of them devotes himself to some particular branch of dentistry. The efficiency of each dentist when he applies himself to his own specialty is increased over 40 per cent. The operator labors more efficiently because he is engaged only on work in which he takes particular pleasure, and wastes no time on tasks which he dislikes or for which he is not specially fitted. Here is where the greatest increase of earning power occurs. The benefit of this increase in earning power, the operator can afford to share with the patient. He loses nothing of what would be his ordinary earnings, rather increases them, while the patient gets his services at a lower fee. A patient who is well treated goes back to the factory and tells his fellow-workers about it. Gradually the clinic gains the confidence of the employees.

The difficulties that the organizers of the clinic met with were not small.

The first difficulty was to get the right kind of men; men who were proficient

along some particular line or who could be trained; men who had the teaching instinct and were interested in the educational side of their profession. This problem has finally been solved after some experimentation.

A second difficulty was the fact that a few members of the profession, who did not understand the project, without taking the trouble or showing the fairness to investigate it, condemned it immediately as an advertising scheme. It seems to be a fact that those who organize others to work with them in an effort to bring good dentistry within the reach of the masses must expect to find many in the profession who will fail to understand the real motive of such a movement. It can be said that the originators of this clinic plan, in its correlation with industrial dentistry, had not clearly foreseen this difficulty. Particular pains were taken that every detail should be conducted along the strictest rule of professional ethics. Ethical dentists were invited to inspect the central office and make suggestions. But despite these precautions, there were the adverse criticisms. The criticisms were redoubled when owing to a mistake made by one of the Milwaukee papers a short news item concerning the clinic was published as an advertisement. The fact that the paper published a retractation the next day was overlooked, as such things are overlooked.

In no city approximating its size, will there be found a fairer, more broad-minded group of dentists than can be found in Milwaukee. Petty jealousy and internal wrangling among the members of the profession are almost unknown. Our county dental society, because of the real service it is engaged in with respect to special instruction of its members, binds the members closely together in one fraternal whole. We are pulling together. We trust one another. Therefore from the point of view of criticism, the Milwaukee Industrial Dental Clinic is most favorably situated. Most of the criticism starts with that element in the profession that cannot, for certain reasons, attain membership in the National Dental Association. This is true, because the success of the industrial clinic idea will either put this element out of business or make them improve the quality of the service they give.

Occupying as I do a position as dean of a college of dentistry in a university that has made ethics a compulsory course in each of its eight professional colleges, I was placed in a delicate position because of the attacks on the clinic. Because of the fact that any personal criticism to which I might be subjected would undoubtedly revert to the university, and become a cause for controversy, I decided to sever all connection, both financial and professional, with the clinic, and leave its conduct and management in the hands of my associates. All of them are high-minded, ethical practitioners whose aim and ambition it is to render the best possible service to the people, and at the same time to keep in mind the highest ideals and traditions in dentistry.

The third difficulty encountered by the clinic is the fact that executives of the industries have not been at all responsive to the idea. The list of firms that cooperate with the clinic has grown only at the expense of tremendous effort. This was doubly true when war orders began to grow less and less, and when men were being laid off in considerable numbers. The working capacity of the clinic is gradually being reached. The Milwaukee Industrial Dental Clinic will not, once the people come to it who should, be able to serve more than half a dozen firms. Two or three similar clinics will be in demand.

The fourth difficulty has been the general suspicion among many of the workers that there must be a nigger in the wood-pile somewhere. Only after some of the patients had received treatment at the clinic has this suspicion begun to be allayed.

Despite these difficulties the clinic is

doing its part in fulfilling its mission, namely, to reduce the price of good, honest dentistry to the working masses.

This form of industrial clinic will not be approved of at once. Ten years will probably pass before it becomes popular with even a small proportion of the profession. Most dentists will always prefer to practice in individual offices, and it is right that they should. Most patients who are educated to the needs for dental services will prefer the individual dentist. The Milwaukee Industrial Dental Clinic idea is but one of the attempts to educate the working masses—the 80 per cent—to the need of dental service and of good dental service.

Let me remark in passing that the men and women who get good dental service in a properly organized dental clinic will not go to the quack. The only appeal over other dentists that the quack ever has is cheapness. The dental clinic robs him of this appeal. Therefore when the Industrial Dental Clinic enters, the quack exits.

Good dentistry for the workers of the world and their families is not an economic problem only, nor a health problem, nor yet a social service problem, but it is all of these problems in one. I am not in sympathy with the arguments which have been advanced in favor of state medical and dental service, because such a system is sure to pauperize mentally the recipients of the service. Educate the people, give them a living wage, permit them to pay for what they get, charge them fees which they can pay and which give the dentist a fair profit

The co-operative dental clinic plan is the best and most feasible plan yet suggested to give high-grade dental service to the workingman and his family. It should therefore be encouraged. The industries, once they are educated up to it, will welcome the plan because it pays them in the better health of their men and requires no investment on their part. The employees can afford to pay for the service, and once they know of it will welcome it because it will add, it is safe to say, ten working years to their lives. The dental profession should favor the idea because it is opposed to state dental service, and because it strikes a body blow at charlatanism and quackery in dentistry.

To recapitulate: The following activities are necessary if the dental profession is to function as it should:

1. The general application of the Fones idea in all schools thruout the country. This necessitates more hygientists and more dentists.

2. Organized ethical advertising in newspapers and periodicals by dental societies whose members are likewise members of the National Dental Association.

3. The reduction of dental fees to those who cannot pay the fees that the dentist must demand today in order to do honest dentistry and make a fair profit. This necessitates the establishment of co-operative clinics, such as the Milwaukee Industrial Dental Clinic, or the establishment of a system by which the state furnishes all dental services, for those who are unable to pay the fees charged by the general practitioner.

When all three of these things are accomplished we will begin to make some headway. It is going to take years of energetic effort of the pioneer kind in order to make even a small impression. The results, however, will be worth the effort.

DENTO-FACIAL DEFORMITIES

(Facies Odontoloxia)

By B. E. LISCHER, D.D.S., St. Louis, Missouri

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

UNDER normal conditions the features of the face frequently combine in so harmonious a manner that they reveal a striking symmetry. It is fast becoming a matter of common knowledge, however, that in the presence of an anomalous dentition these same features usually disclose manifest modifications. In many instances a facial deformity is the final factor which induces parents to seek a cure for the child's dental malocclusion. And the development of effective remedial measures for such abnormalities is now regarded as a signal achievement of modern orthodontia.

Every dentist who has a reading knowledge of our literature realizes that a vast progress has been made during the last twenty years in this department of our profession. Sundry of our experiences have finally received a new interpretation, for we speak now of advanced methods of treatment, of fundamental principles, of the *science of orthodontia.*

The study of the factor of variation, by which we mean dissimilarity between organs or qualities that are homologous, has led to the concept that *variations are of germinal origin, or congenital.* "The character, the influence, the regularity or irregularity of variations, their behavior in heredity, whether transmissible or not, whether acquired or congenital, whether determinate or indeterminate, etc.—these are the problems which the factor of variation or variability presents to biology. Heredity, too, has its problems. But no one disputes their reality; nor does any one deny their fundamental and indispensable character in relation to the origin of species and the evolution of organisms" (Jordan and Kellogg).

Modifications, on the other hand, are wrought in an individual's lifetime, *are somatogenic, or acquired.* These undoubtedly deserve the same critical study as do variations. And when facial modifications are found associated with abnormal dentition, their correction should not be regarded as an incident, or spectacular by-product, of orthodontic accomplishment. Our practices provide a daily opportunity for research in this realm.

1. *Methods of judgment.*—Students of physical anthropology regard man as a "wandering and enterprising animal, for whom there exist few insurmountable barriers." They have studied variations of his form, especially of his facial features, in great detail. One of the chief accomplishments of the International Congress of Anthropologists held in Monaco, in 1906, was a unification of the technical measurements most commonly

employed on the head and face. The proposals of the committee on standardization comprised thirty-eight measurements for the skull and nineteen for the living head and face, which were ratified by the congress, and which have since been widely accepted by anthropologists.

By means of these anthropometric measurements a great many valuable data are being collected and they suggest a field of research to orthodontists of the highest practical importance. The various indices (such as the gnathic, dental, palatial, cranial, etc.) are known to all students of anatomical science; but the soft parts of the head and face have now become the object of similar painstaking study. The regions of the eye, outer ear, nose and mouth; the skin, hair, nails and eye color; and the correlation of the skin, hair and eyes, are all regarded as material of the highest importance by the man of science.

In the mouth region the anthropologist looks for variations of the sulci, filtrum, upper and lower lips, the mucous membranes of the lips and the length of the oral fissure. The formation and general contour of the lips are so variable that classifications are deemed desirable and are rapidly gaining acceptance.

Dentists have reported many modifications of the mouth region (especially when associated with dental anomalies), but they have not yet examined them minutely or critically. They have, in a general way, called attention to the fact that nearly all forms of dental malocclusion are complicated by facial modifications. Attempts to judge the relative aesthetic value of such faces date back to an early period in orthodontia. In the writings of Kingsley and Farrar, for example, aesthetic considerations are emphasized in making a correct diagnosis. The need of a standard by which facial deformities might be judged was plainly felt, but the infinite multiplicity of facial types made the task seem hopeless. These early efforts might conveniently be referred to as the *period of empiricism.*

During the last twenty years we passed thru another stage of development, *a period of idealism,* when the occlusal theory of Angle and the facial theory of Case gained many followers. According to the former, practically all dento-facial deformities can be fully comprehended on a basis of the occlusal relations of the teeth. The deviations from normality observed in this respect were classified into *three* groups comprising *seven* "types." The presence of every permanent tooth in ideal occlusal contact with its antagonists was pronounced "the basis of the science of orthodontia," and the extraction of one or more teeth for the facilitation of a treatment was utterly condemned. We were also told in no uncertain terms that "the interpretation of Nature's wishes" demanded a full set of teeth; and to make this exhortation doubly effective nature was usually spelled with a capital *N*.

In Case's work the occlusal theory has not been so rigidly adhered to and the outer facial form is regarded of sufficient importance to warrant a more critical consideration in making a diagnosis than had hitherto been the custom. The face is divided into a *changeable* and an *unchangeable* area; and it is pointed out that since orthodontic treatments frequently achieve corrective changes in facial expression, the operator's conception of normal facial form might ultimately become as safe a guide in making a diagnosis as the occlusal relations of the teeth. This, of course, implies a cultured conception of normal facial form, and it is only fair to Case to say that he has never been misled by the illusion of infinite perfection.

The real clash between these two con-

tending schools of thought came finally, however, when Case demanded that in the treatment of a few extreme deformities extraction of one or more teeth was positively indicated. This precipitated a debate in recent years with which all are familiar. But out of this controversy there now emerges a new period for orthodontia, namely, the *period of rationalism.*

Empiricism and idealism are still practiced (perhaps in decreasing measure), but we are beginning to realize that the various facial modifications must be critically analyzed and countless data collected before final conclusions are permissible. The pathogenesis of dento-facial deformities is but faintly comprehended and a great deal of work has to be done before we can appreciate the details of every stage of their maldevelopment. Until we investigate the matter we will never know the correlations (if any) that exist between head form, facial width and length; maxillary and mandibular width and oral fissure length, etc. in any given kind of dento-facial deformity.

The face is undoubtedly the most conspicuous part of man's body. Figuratively speaking, it is the gateway of the soul, thru which all impressions of the environment pass and leave their mark. All the nobler and higher functions of the mind enliven and quicken it in a most delicate manner. Even without the spoken word (as the "movies" of today abundantly testify), it faithfully records every mood, motive and disposition.

The frequent symmetry of its features not only arouses our admiration, but leads us to a consideration of its *aesthetic values.* This, unfortunately, involves us in the most difficult problem of aesthetics, namely, that of *beauty of form.* To the student who pursues this science "under the inspiration of a naturalistic psychology," all values are in a sense aesthetic, and "all preferences are ultimately irrational." A critical study of the elements of beauty, of form, symmetry and expression, makes it "impossible to demonstrate the existence of eternal types in external nature or the mind of God." "All ideal forms have an emotional tinge" (Santayana).

2. *Anamolies of dentition and their concommitant modifications.*—The anomalies of the teeth have been variously classified, but the scheme suggested by Magitot gives perhaps the best general outline. It embraces the anomalies of eruption, form, structure, number and position, and of the jaws beyond. The orthopedist, on the other hand, studies the ever-recurrent combinations of these elementary deviations, and the modifications of the adjacent tissues resulting from the consequent altered functions. He aims to group these combinations in such a manner that the relations between cause and effect, between functional disturbances and structural lesions, can be more readily recognized. Thus the anomalies of position and of arch form, of arch relation and jaw formation, of facial form and habitus, are regarded as basic or primary lesions. Those of eruption, number and structure, etc., are secondary.

The orthodontist recognizes ten kinds of malposition of the teeth and their many possible combinations. Some of these are found in every class of oral deformity. Arrest of development of the alveolar processes is a common complication. The form of the dental arches is thus frequently involved, and in cases of extreme malposition, especially of anterior teeth, such facial structures as the lips are modified in function, form and relation.

The relation of the mandibular arch to the maxillary arch is frequently abnormal; which malrelation may be toward the distal, or mesial, and may in-

volve either one, or both, sides. In these cases the facial modifications are usually more extreme.

The osseous structures beyond the teeth, i.e., the jaws, may also be deformed. Such abnormalities, tho relatively less frequent, constitute the most difficult group with which we have to deal. These may be roughly classified into mandibular and maxillary deformities. Very rarely lesions of the mandibular joint and malpositions of the mandible are met with.

Functional disturbances are found in most cases of oral deformity, e.g., abnormal breathing and subnormal oxidation of the blood, faulty articulation in speech, impairment of the sense of hearing, deficient mastication of food, interrupted mental development, etc.

This rather brief outline of the basic modifications found in dento-facial deformities is sufficient, nevertheless, to caution every inexperienced practitioner —their correction is not merely a matter of mechanics. The solution of difficult orthodontic problems does not lie in a patented appliance.

3. *The pathogensis of dento-facial deformities.*—While judgments of the probable result of, or prospective recovery from, disease or deformity necessarily vary in accordance with a practitioner's experience, they are, nevertheless, dependent upon the pathology found in each case.

In orthodontic practice it frequently becomes necessary to render an intelligent opinion in advance of actual treatment; and it is well to remember, therefore, that a favorable prognosis depends very largely upon an early diagnosis, when conditions are such that a comparatively simple treatment will suffice. Formerly it was customary to postpone most treatments until all of the permanent teeth had erupted, for it was believed that nature would assist in the correction of the malocclusion, that most patients would "outgrow" the deformity. This actually happens occasionally; but only occasionally. Many bitter disappointments have taught us the error of such advice when given in wholesale fashion. The severe forms of malocclusion do not develop overnight but are of slow growth. Hence it follows that years before even an intelligent parent recognizes the impending deformity, the alert diagnostician can advise ways and means for its prevention.

The valuable work of Bogue and others, on the width of the normal maxillary arch, on the relation of this to the growth of the skull and face, and its importance as an early diagnostic sign, is indicative of the trend of present-day orthodontic thought.

Owing to the mechanical aspects of dentition (due to the inclined planes of the cusps of occluding teeth), the self-correction of most forms of malocclusion is an impossibility. Nature and time rarely exercise a corrective influence upon them. Every fact gleaned from a study of the process of dentition substantiates the orthodontic axiom that *dento-facial deformities are progressive, not static.* To be able to detect the various kinds in their incipiency and to divert the underlying forces into channels of normality, is now regarded as one of the highest missions of orthodontia.

We are beginning to realize that some of the simplest deviations frequently drift into serious deformity; that apparently harmless malpositions of the teeth ultimately become major lesions. And when they finally reach their maximum of maldevelopment, a full restoration of the normal often becomes impossible.

4. *Differential diagnosis.*—The various classifications of oral deformities may, in a sense, be regarded as an index

to our knowledge of pathology. As intimated above, further investigations are necessary before we can fully comprehend their structural lesions and functional disturbances. Hence it is reasonable to assume that as our knowledge is rendered more complete, our diagnostic schemes will be broadened and ultimately include all clinical types. But this advance cannot occur as long as we approve an *exclusive occlusal interpretation,* as long as we stand upon a phenomenon and not upon the *ensemble* of manifestations.

We are reminded here of that era in modern medicine when it was believed that bacteriology would supplant clinical observation. The laboratory examination of cultures was so alluring that for a brief moment it seemed destined to replace examination of the sick. The exclusive occlusal interpretation of oral deformities "represents an old tendency in medical history, the tendency to appear exact by disregarding the complexity of the factors and variations involved" (Campion).

Dento-facial deformities are not merely occlusal deviations. To regard malocclusion as the major lesion in every case, to always look upon it as a primary affection when in all probability it more frequently is a subordinate manifestation, is a fundamental blunder.

Campion has recently called our attention to this subject and offered a number of constructive suggestions, besides indicating the manner in which a final and definitive classification will be realized. Accordingly, the relation of normal as well as abnormal arches, both severally and jointly, to the facial configuration must be intensively studied; and the knowledge thus gained will be reflected in our diagnostic terminology. To speak of certain extreme forms as "hereditary deformities" as "Class II cases," or as "posterior mandibular occlusions," etc., is to fail in a comprehension of their pathology. Such terms are not specific enough and mark no advance over the discarded labels of years ago, e. g., "inferior retrusion," etc. In the light of our present knowledge, the difficulties of a differential diagnosis may be briefly stated as follows:

Malposition and malocclusion of the teeth may be considered as a primary lesion in only a limited number of our cases and their exact percentage is unknown.

Malrelation of the dental arches with only slight involvement of the adjacent osseous structures is relatively infrequent and cannot be finally determined on a purely occlusal basis. Many of the deviations formerly recognized as arch malrelations are in all probability deformities involving the jaws and facial contour.

The maxilla and mandible, as well as the mandibular joint, may also be involved, but at the present time we have no means of estimating such deviations.

The development of *supplementary diagnostic aids* is, therefore, one of the most pressing needs in orthodontic practice.

Anthropometric measurements of the facial features and head-form, and accurate graphic records, e. g., photographs and models, constitute a field of research of very great importance.

Anthropometry and pediatrics are so intimately related to orthodontia that many of our problems can be solved only by a closer affiliation with these sciences.

Discussion

B. Frank Gray, San Francisco, California: Those of us who have been in orthodontia for many years recognize how difficult it is to treat cases that have existed for many years, so I think we should take a little chance of erring on the side of too early treatment rather than on the other.

About the question of over-extraction concerning which something has been said, I

feel that about a thousand times more harm will be done by the profession at large if they get the impression that extraction is a necessary part of orthodontia than in any other way. In sixteen years I have extracted one tooth. I may have made a mistake in not extracting more, but I think many more mistakes will be made if dentists in general get the impression of too much extraction.

Thomas L. Grisamore, Chicago, Illinois: I think one of the most important phases of orthodontia, and the one we are overlooking more than any other, is the question of diagnosis. When the general practitioner will apply the knowledge he acquired, or should have acquired while only a dental student, regarding the care of children's teeth and the serious effects of their neglect, the number of cases of orthodontia will be materially reduced. It hardly seems fair to the child that he be subjected to months and possibly years of orthodontic treatment simply because the conditions of his mouth were improperly diagnosed and a few hours were spent in making the necessary repairs.

Regarding the time to begin orthodontic treatment, no definite age can be set for starting these cases. We must first be sure that the irregularity will not be corrected without interference as the child develops. No doubt we have all seen cases where malaligned teeth in very young children have aligned themselves beautifully without orthodontic interference as the children grew older.

Cases should be started as early as possible after we are positive nature will not correct the deformity, unless the time of treatment can be materially shortened without permanently interferring with the development of the physiognomy.

Martin Dewey, New York City: We have to remember that occlusion of the teeth does have a certain relationship to the face. We may go back farther and find that the shape of the teeth governs the shape of the arch, and going back to the evolution of the face, we will see that the tooth has been responsible for much of the development of the face. If we approach it from that standpoint we may be able to realize some of the factors that enter into this question. Just as a sort of a little survey of a certain part of this question, and considering some of the things that enter into the formation of the face, we have to remember that the oral cavity has been evolved thru many years, and that the different parts all have certain functions to perform. The fish, for example, does not have much of a face; it is almost all mouth. As you approach the mammal the face changes greatly in formation, and when you reach the consideration of dento-facial deformities you have to consider the teeth and the oral cavity as entering into the formation of the face. Then the function of respiration and the formation of the muscles of respiration must be taken into account. In other words, function plays an enormous part in dento-facial deformities and has played an enormous part in the formation and evolution of the face. If we can get these cases at the proper time so as to restore the proper function we will end up with practically the normal facial development. Our whole object, as I understand this work, is to restore function. If we can secure the normal function the deformity will often disappear. If we recognize the functions of the different structures and the different muscles, and restore those functions we will more nearly have a normal facial development.

MOUTH HYGIENE LECTURE FOR HIGH-SCHOOL STUDENTS AND ADULTS

By EARLE S. BRAITHWAITE, D.D.S., Willard, Ohio

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

FOREWORD

IT MIGHT be interesting to you for me to give a short sketch of the history of dental lectures. The first dental lecture given by dentists in public schools was given at Lawn School in Cleveland, in 1909. This was a lecture that had been worked out by twenty-five Cleveland dentists and each one of the four parts were to occupy fifteen minutes. It was found to be entirely too scientific and was revised and cut down by Miss Cornelio O'Neil of Marion School. It was still found to be too long and the wording not simple enough for the average audience so it was given a number of times under the direction of our chairman and frequently revised and in 1911 was published by the Oral Hygiene Committee of the Ohio State Dental Society. Modifications of these lectures were repeatedly given in the army camps in Ohio and on one occasion was given to every man stationed at Camp Sherman. Over 20,000 men and officers heard this lecture within one .week We still appreciate the inadequacy of this lecture and also realize that it may not meet all of your demands.

We found there were certain procedures that worked out best in arranging our lectures. For instance, school teachers always think they are overworked and we found that the most acceptable way was to arrange, if we could, to have the first-grade children come and sing some of the songs that they have in their regular class work. We always apologized to the teachers when we asked them to bring their children at night, if the lectures were in the evening, and laid stress on the fact that we would not for anything cause the overworked teachers any additional work. This bringing out the first grade children assured us of an audience to the extent that the children had to have adults come with them. Then we tried to get some other musical entertainment from the pupils. Part of this commenced the lecture and the rest was given before the second part of the lecture. This divided the lecture and made it less monotonous. We also had display cards which in some cases were put in store windows and we further distributed them to the school children. The card read as follows:

YOU ARE INVITED TO ATTEND AN
ENTERTAINMENT AND ILLUSTRATED LECTURE
ON THE IMPORTANCE OF THE CARE OF THE TEETH
GIVEN UNDER THE AUSPICES OF THE SOCIAL CENTER COMMITTEE
AT LAWN SCHOOL, THURSDAY EVENING MAY 26, 1921.
GOOD MUSIC THIS ENTERTAINMENT IS FREE

These cards were sent home by the pupils three days before the lectures. This we found by experiment to be about the right time. Window display cards were sent out not more than ten days nor less than one week before the lecture.

We have many schemes for creating interest in mouth hygiene; one that is quite successful is to offer a prize for the best jingles. These were received by Dr. C. R. Hoffman, the dental clinician at the Boys School in Cleveland.

MOUTH HYGIENE LECTURE

THE IMPORTANCE OF THE TEETH

The mouth is one of the most important parts of the body and yet it is the most neglected part. The mouth is the gate to health and happiness and all food must go thru this gate. Food is selected first by *sight,* then by *smell,* and last but most important, by *taste,* and taste takes place only in the mouth.

Taste is the last test that Nature has given us to use in separating good food from bad. Good food tastes good and may be swallowed; while bad food is detected by the taste and is rejected.

Horace Fletcher has said: "Every bit of food must be tasted and only that food which has been thoroly tasted and found pleasant should be swallowed." Mr. Fletcher was a strong healthy man, sixty-one years old when he made that statement, and had taken strength tests which showed him to be more than twice as strong as the best young college athletes. Yet twenty-five years ago the doctors said he could live only a very short time, and they were right, because he was a sick man and would have died if he had not learned to eat in the right manner. The wonderful change in this man's health was made simply by thoroly chewing his food until he got out of it all of its taste, then swallowing it. He sipped and tasted liquids, like milk and soups.

Before food can be tasted it must be ground into very small pieces in the mouth, and the teeth are placed in the mouth to do that grinding. During the grinding and tasting of food a watery substance called *saliva* enters the mouth and is thoroly mixed with the food. This saliva keeps the food and the mouth moist and changes some foods from an indigestible kind to digestible. *Digestion* in the simplest language is changing food into blood, and the first part of this change must be done in the mouth, with the aid of the tongue, cheeks, lips, and teeth. The saliva moistens dry foods so that they can be tasted, changed and easily swallowed.

Good teeth, then, are very necessary to our health, and if we use them properly in preparing our food we should receive large returns in health, strength, endurance and freedom from sickness. The United States Public Health Service has said that "good teeth are the most important attributes of a soldier." It points out that a soldier may have good feet, good eyesight, and good brains, but if he has bad teeth he cannot eat, and if he cannot eat he cannot march near enough to the enemy to see him and use his brains to fight him.

For about six months after a baby comes into the world he has no teeth and does not need them because a liquid food is provided. At about the age of six months the *first* of the temporary teeth begin to come thru the gums, and these are the lower central incisors, and they are followed closely by the upper central incisors; *second,* lateral incisors, seventh to tenth month, lower and upper; *third,* first molars, twelfth to sixteenth month, lower and upper; *fourth,* cuspids, fourteenth to twentieth month, lower and upper; *fifth,* second molars, twentieth to thirtieth month, lower and upper. This completes the temporary set, making twenty in all. The temporary teeth are often called first, deciduous, or baby teeth. As soon as these teeth appear they should be watched and kept clean because they decay very easily. The plan of taking out or pulling these teeth when they decay or ache is very wrong. The child needs teeth to chew with and besides losing them too soon may make trouble with the permanent teeth which follow them.

The first temporary teeth to drop out are the *lower central incisors,* which were the first to come in, and they are replaced by the *permanent central incisors* at about the seventh year. The first permanent tooth to appear, however, is the *first permanent molar,* called the six-year molar, which comes thru the gums at about the sixth year just back of the second temporary molar. This very important tooth is generally mistaken for a temporary tooth and is too often allowed to decay and be lost with the thought that another tooth will follow it. Counting the temporary teeth from the center on each side, this first permanent molar is the sixth tooth.

The incisors cut, cuspids tear, bicuspids tear and grind, and molars grind. The temporary

teeth do not all drop out at one time. If they did the child would be without chewing surfaces for a long time, and he would likely suffer for it. Nature has wisely provided that the temporary teeth shall lose their roots and drop out in pairs and be followed by permanent teeth in a very short time, so that the child, during the great growing period may have the means of chewing his food properly. The lower teeth come in first, and the plan seems to be to fit the upper teeth over the lower. The temporary teeth have roots similar to the permanent teeth, but just before it is time for the temporary to drop out those roots disappear or are absorbed, leaving only the crown to drop out. All the temporary teeth should be replaced by permanent ones by the eleventh or twelfth year. The bones which support the teeth are the upper and lower jaws. The upper jaw is the roof of the mouth and that part of it which holds the teeth is shaped like a horseshoe. The upper jaw-bone is firmly attached to the other bones of the head but the lower jaw-bone is only attached by means of muscles and ligaments and it hinges or moves from very loose joints which may be felt just in front of the ear.

The jaws are covered with a tough fleshy tissue called gums. The teeth project from the bony sockets thru the gums into the mouth.

Teeth have three parts: the crown, the neck, and the root. The crown is that whitish part that we can all see, the root is that part which fits into the jaw-bone, and the neck is that part between crown and root.

Teeth are not fastened solidly to the bone of the jaws but are set or held in place by a cushion which gives the teeth a springy motion in chewing and prevents the noise and jar that a rigid attachment would have. This cushion is called the peridental membrane and it contains fibers which are ropelike attachments to hold the tooth to the bone.

The tooth itself is made up of four different kinds of material, enamel, cementum, dentin, and nerve or pulp. On the outside of the crown is the enamel, the white, glassy, shiny part that you can see. This enamel is the hardest known animal material and covers the crown as the layer of chocolate covers a chocolate cream. On the outside of the root is the cementum. Within the enamel and cementum and making up the main part of the tooth is the dentin. This dentin is a hard bonelike material which appears solid to the naked eye but under the microscope it is seen to be full of little holes or tubes which run from the outside enamel and cementum to the nerve or pulp. These little tubes, or tubules as we call them, contain little nerve fibers which carry little messages of heat or cold or pain to the larger nerves in the pulp.

Within the dentin is what is commonly called the nerve. It is more than a nerve for it contains nerves, veins, and tiny arteries or blood vessels and if you should cut it, it would bleed and hurt just as your finger would.

If the enamel of your tooth becomes broken or decayed, the little nerve fibers or telegraph wires in the dentin carry the message of pain to the pulp, then along the nerves to the brain and you are warned that something is wrong. If we do not heed this warning at once decay is liable to do greater damage and the entire tooth or several teeth are lost and our health is in great danger.

In a normal set of teeth we have an example of a perfect grist mill, for the food may be finely ground and mixed with the saliva and the first process of digestion gets a good start in the mouth. The chewing surfaces of the temporary set of teeth are rather flat but in the permanent set they are cusped or pointed so that more surface is provided for masticating food. The roof of the mouth should be broad and well rounded, which indicates that there are good breathing passages above in the nose, because the roof of the mouth forms the floor of the nose. A miller who has good machinery grinds his wheat well and prospers. One with imperfect machinery does not do good work, loses his customers and grows poor. What would we think of a miller who did not keep his grinders in repair? If his mill does not grind well he is poor.

We may now consider dental deformities or irregular teeth to better understand how they interfere with health, comfort, and appearance. When the bones that support the teeth do not grow regularly, teeth cannot come in right and their chewing surfaces do not fit so as to thoroly cut and grind food. These irregularities are called malocclusions and they do not correct themselves. When teeth are crowded too closely together, food packs into the spaces between them and ferments, producing an acid which causes the teeth to decay. If this decay is allowed to continue the teeth break down and tip toward one another in as bad a manner as when teeth are entirely lost; but this is not all the evil result. The gums bleed and the decayed, diseased matter mixes with the food and saliva and is carried to the stomach and gets into the general system.

Poison forms which ruins the health and may even cause death. So we must understand that irregular or crooked teeth need more care to keep them clean than regular teeth.

Mouth breathers, children who habitually breathe thru the mouth instead of the nose, because of a very narrow upper jaw and small nose passages, often suffer from adenoids and enlarged tonsils and cannot enjoy play like other children; they are often sick, tired and dull because they breathe too little air. They need the attention of doctor and dentist. Mouth-breathing is not all habit. Some children cannot get enough air thru the nose and must breathe thru the mouth.

Quite often some teeth never form so that sometimes it becomes necessary to look for them with the X-ray. X-ray diagnosis often brings to our attention blind abscesses at the ends of unsuspecting teeth and also serves as a great aid in the treatment and removal of impacted wisdom teeth or third molars. The X-ray diagnosis brings to the attention of the dentist many cavities that otherwise would be overlooked and helps to determine the extent of decays. The third molars are the last teeth to come in and if the jaws have not grown properly they have to crowd in. The result is a great swelling and severe pain, which needs a surgical operation by a skilful dentist to relieve it. In case such a swelling starts, go to a dentist at once before it becomes worse and more difficult to treat. Accidents sometimes knock teeth completely out. If this happens, clean the teeth and put them back into their sockets or take the child to a dentist at once. There is a good chance for such teeth to grow firm again.

Thumb-sucking and constant use of a rubber nipple may make the arch of the mouth grow incorrectly and consequently may interfere with the growth of the teeth.

Then why not be careful of your teeth which means your health! go to the dentist when there is just a small hole; do not wait until you suffer much and the hole gets larger. In the next talk we will tell you how to keep your teeth healthy.

CARE AND TREATMENT OF THE TEETH

We believe that many do not appreciate the value of their teeth until carelessness and neglect bring the teeth to such a state that repair is impossible. It is unfortunate that unclean conditions should prevail in the mouths of a large proportion of our adult population. It is appalling and disgraceful that so many children should have to struggle for strong bodies and minds against such a handicap, with no concerted effort on the part of those who have their welfare in charge to remove it.

The examination of the teeth and mouths of thousands of the children in our public schools show but a very small percentage of healthy mouths, while a great majority were in a condition of shameful neglect. Badly broken down teeth, abscesses, spongy and inflamed gums were common. These bad conditions can be changed, and it is part of our purpose to show you how it may be done. One word will explain it all, *cleanliness*.

Clean teeth will not decay. Clean mouths will not spoil the food nor contaminate the air. Cleanliness is a magic word, for it means health and happiness. If cleanliness keeps us healthy and happy, we need not go as far to find the cause of most of our suffering, for uncleanliness is mankind's greatest enemy. A hurried, careless cleaning of the teeth will not do. For if we are to enjoy the benefits of cleanliness, there must be a thoro cleaning of all parts of the mouth and teeth.

Do you know that your mouth, my mouth all mouths, even in health are the homes of great numbers of germs, and a large number of them are trouble makers? Chief among the germs that make their homes in our mouths are the ones that cause the teeth to decay. These germs attack our teeth, and by steadily working away on the outside of the tooth, they finally break down the enamel, or outer covering and then begin to destroy the dentin, or inner tooth substance.

Most mouths, however, are just the ideal homes for such trouble makers to thrive in. The mouth is warm, the teeth have rough grooves and deep pits in some surfaces; there are V-shaped spaces between them and often, a slimy green coat. The food we eat is crowded into the V-shaped spaces and grooves and pits and allowed to remain there undisturbed, furnishing the proper food for germs. Amid such surroundings the decay germs grow fat and strong and are free to do as they please, and before you are aware of it you are howling with pain. The little germs have eaten their way into the very heart of the tooth and you are sadly awakened to the fact that great havoc has been wrought and you are surprised to discover that the teeth which nature has provided for your service and beauty, are rapidly being destroyed. All this is the result of either ignorance or wilful neglect, and pain and suffering is the pen-

alty. Because of this carelessness a large percentage of the teeth of children are diseased. Older people may not suffer so much from decay, but teeth are being lost every day from destructive gum troubles, which result, in most instances, from nothing else but uncleanliness in the mouth.

DEMONSTRATION OF CLEANING

Even tho the teeth are brushed carefully, you cannot reach all the surfaces of the teeth, so you also have to use a sharp quill and dental floss in order to cleanse all the places. No person can, unassisted, keep his mouth in a thoroly clean condition. It is necessary to visit a dentist at frequent intervals. The dentist must polish all surfaces of your teeth and thoroly cleanse the mouth. There are about twenty-five square inches of tooth surface in the mouth. Two-thirds of this area you yourself can keep fairly clean by use of a brush, but the other third you can scarcely ever touch, and these are the surfaces where the trouble generally begins; they are the very places where the little decay germs hide themselves upon the tooth. If we are going to prevent decay, these surfaces must be polished, and the dentist is the only one who can do it thoroly, and furthermore, in order to do it he must see you oftener than once or twice a year. For remember the decay germs can get a good start in less than six months.

Make brushing your teeth and gums a part of your morning toilet; never eat your breakfast without thoroly cleansing your mouth. Brush your teeth again thoroly before you go to bed and you will sleep better and awake in the morning with a better taste in the mouth.

Furthermore, when everyone keeps his mouth clean, there will be less need of establishing hospitals for the cure of tuberculosis, less fear of an epidemic of diphtheria, and many other contagious diseases that are a menace to the lives of our children. Many cases of severe illness have their beginnings from poisons found in the mouth. Diseases come from germs which may find their lodgment within the mouth and decayed or abscessed teeth and bleeding gums and exposed pulps are a very hot house for their growth. If the mouth and teeth are kept clean these germs do not have a good chance to grow and therefore diseases of the body are much less likely to occur. Isn't it worth while to be clean? The first word in care and treatment of diseased teeth and gums should of right be to parents. From much unwise talk on the part of elders, children often have exaggerated ideas of the pain involved in the proper treatment of dental troubles, and they hide the defects of which they are aware, in order to escape what they fear from the treatment. Beginning at the early age of two and a half or three years, parents should instruct the child in the value of cleanliness in the mouth, not only in brushing the teeth but also in keeping the gums and tongue clean. Coarse grained bread and food that requires thoro chewing is better than too much soft, mushy food. Many a boy will eat crusts if he knows it will make good muscle; and the girl will do the same if she knows that it will make a clear complexion and red cheeks. Coarse grained food demands a more thoro mixing with saliva before it can be swallowed, and thus benefits digestion. Do not permit the child to wash his food down with gulps of water, milk, or other fluids.

What boy has not been ashamed after mother looked to see if he has washed his ears. Let the mother pay the same attention to the mouth as she does to the ears. If the mouth is not kept clean it is in a poisonous condition, that is, it contains poisons which may and do poison the whole body.

Watch the first permanent molar very closely because it is very important in the development of the jaw. Many mothers make a very grave mistake in believing that the molar tooth which comes at about the child's sixth year is a first or temporary tooth; but remember that this tooth belongs to the permanent set and should be preserved by all means. This tooth is more likely to decay than any other, and for that reason it should be carefully watched. Keep the temporary teeth in as good condition as possible till they have served their purpose and give place to the permanent ones. When the gums are healthy they are pale pink and hard. When diseased they are red or bluish and swollen and soft and bleed easily. This may be caused by a substance known as tartar that is deposited on the teeth at their necks and sometimes under the surfaces on the roots. It ought to be removed by a dentist. Brushing the gums makes them firm and healthy. Proper brushing also prevents the tartar from forming on the surface of the teeth.

A few words on the kinds of toothache and how to treat toothache are necessary when you cannot reach a dentist. It is right and good to stop toothache at once, but if you let it go at that and just apply a little medicine to stop pain, you only put off trouble to a time when it will be very much greater. Teeth ache first from irritation of the pulp, and sec-

ondly from disease of the peridental membrane, a thin cushion between the bone and tooth. Just as soon as the enamel, the glass-like protection which nature has supplied, is broken down or worn away, the dentin underneath becomes sensitive. Then it is noticed that hot and cold food and drink, as well as acids and sweets give a sharp sting. If this first alarm is not minded, the dentin will often become less sensitive and decay will proceed rapidly so that a worse trouble results, namely, exposure of the pulp. When the pulp is thus exposed, seeds or particles of food by pressure give a sharp pain and often set up a long continued pain. The pain by both of these conditions can usually be overcome by some simple remedy; of these, oil of cloves is the best. After thoroly rinsing with warm water to wash out food particles, this remedy should be applied on a little pellet of cotton and carefully placed in this opening in the tooth so as not to produce pressure. Sometimes in certain cases of inflamed nerves or pulps, cold water held in the mouth will stop a severe ache. But do not make the mistake of letting that treatment suffice, for such a tooth needs attention at once. Often it can be saved by your dentist with little or no pain.

Next, after exposure of the pulp, comes trouble due to infection and death of the pulp. This infection progresses thru the end of the root, whereupon another kind of pain arises due to disease of the peridental membrane or cushion. This pain may be only a sensation of soreness, that is, the tooth seems longer than the other tooth and hurts when you shut up tight upon it, or the infection may rapidly lead to the formation of an abscess attended with great pain and a swollen face. Here again the best thing for the child is to have a competent expert, namely, a dentist, see the case. Some things, however, the mother can do, if the trouble is noticed early. Counter-irritation, which is obtained by painting some medicine like iodin tincture on the gum over the sore tooth will often prevent an active abscess and does not interfere with proper treatment by the dentist later. But the thing which really ought to be done is to relieve the pressure which causes the pain, by making an opening thru the tooth; it is sometimes necessary to make an opening thru the gum and bone. A dentist should do that. If the abscess burrows its own way out, it takes much longer to discharge, and the patient becomes very ill. Care should be exercised in the use of the poultice. True, the heat relieves pain, but it also may cause the abscess to break on the face. It is much better to use hot figs or raisins on the inside of the mouth. Have the child drink freely of water, and give him a hot foot bath.

In conclusion: *First,* decay of the teeth is not due so much to poor teeth as to uncleanliness and negligence. *Second,* youth is the period of greatest danger from decay. *Third,* you cannot estimate too highly the value of good teeth and a healthy mouth. Much individual suffering can be prevented and the general health greatly benefited by taking care of your teeth. It is not expected that you will be able to care for or prevent all the ills due to diseased teeth, but these suggestions are for emergencies or times when it is not possible to obtain dental advice. Send the child at least twice a year to a dentist whom you can trust, for expert examination. Your family physician will be able to direct you to one who will help you care for the teeth of these little ones, and it is economy to have them examined from time to time, thus preventing diseased conditions.

TISSUE ATROPHY RESULTING FROM COMPRESSION OF TISSUES FOR THE RETENTION OF DENTURES

By RUPERT E. HALL, D.D.S., Chicago, Illinois

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

ONE of the most prevalent questions propounded by the profession in the subject of denture making, is, Why did a certain tightly fitting denture become loose at the end of two weeks, a month or so?

Atrophy of compressed, valve-forming tissues is the cause of the denture becoming loose. This condition of tissue change manifests itself in areas where the base and periphery exert uneven pressure upon the tissues, occasioned more particularly about the peripheral tissues by the valve construction of the modern denture. The term "modern denture" is used advisedly, as the value idea is not so new now, but only of late years has its principles become very generally practiced. To W. V. B. Ames and the Breen brothers are due the credit for this principle of denture design and construction, Dr. Ames first introducing the principle in 1885.

We learn by clinical experience that tissues compressed for the purpose of establishing valve seal between the periphery of the denture and the soft tissues, atrophy and become more or less sluggish and lose, to a great degree, the function assigned to them. After a period of a few weeks, or months, the once very tightly retained denture is discovered to have lost its remarkable and spectacular retaining qualities. Then follow the mystery and disappointment to both patient and dentist. And not infrequently but almost invariably is the dentist held accountable by the patient for this uncontrollable change. Indeed it is a most deplorable and discouraging occurrence to have a patient present a not long since satisfactory denture with the statement: "My denture has become so loose I can keep it in place no longer."

There are two causes for this condition: One we may term due to a false fit occasioned by the creation of a vacuum by strong peripheral valve seal and absence of adaptation of the base of the denture, which produces sealed space beneath the denture. This space, evacuated in greater or lesser degree, very shortly satisfies itself by establishing a leak at some weak point in the valve about the periphery of the denture, or the vacuum is obliterated by the settling of the denture or by causing hypertrophy of the tissues and filling in of the cavity.

The other cause is a very different condition. We may have a denture retained by vacuum and have complete adaptation of the entire base and periphery with no space beneath the denture. The vacuum in this instance is established by movement of the base of the denture from its basal seat without the admittance of air

about the periphery by valve seal action of the movable peripheral tissues. To effect this result it is customary to imbed or engage the periphery of the denture with the peripheral tissues. Such relation of the periphery with the soft tissues is usually accompanied with more or less pressure upon these tissues.

Compressing the tissues for valve seal causes strangulation, stasis, and atrophy of the tissues. Modifying the blood supply, thru which the tissues receive their nutrition, causes lowering of the tone of the tissues and atrophy.

Try as hard as we may to establish a permanent tight-fitting denture, in jaws requiring tissues compression the patient must be content with only a moderately tight or loose denture, which in practically all cases is regarded a failure by the patient in comparison with the initial fit.

What, then, do we gain by compressing tissues and repeated rebasing for tight dentures? Would it not be much better to fit a denture only as tightly as it will remain or as it will ultimately fit if the tissues are compressed and repeated rebasings are made and save our patients the expense, annoyance, and disappointment incident to tight-fitting dentures becoming loose?

Examples of tissue atrophy produced by like causes that will make clearer to those unfamiliar with the change described may be seen where one wears a finger ring or eye glasses. The finger shows reduction in size and the nose and ears show depressions from the pressure of the bridge and temple hooks. The eye-glass manufacturer aims that glasses as a fixture be as light as possible to avoid inflamed and deformed conditions to the nose and ears.

Compressing the tissues also interferes with nutrition, thru disturbed trophic nerve function. Example of impairme[illegible] of trophic nerve function is seen in alopecia (loss of the hair) from pressure of the hat band.

The same results as seen in the case of the finger ring and glasses are found to occur about the tissues of the jaws, where compression of the tissues is a part of the plan in the retaining of a denture.

Rebasing a denture, taking up the slack or loss of compression in the atrophied areas, for the re-establishment of valve seal and tightness of the denture has in the past constituted a great part of the work in the modern prosthetist's practice.

Rebasing the denture for the re-establishment of tightness of fit, while spectacular and pleasing for the moment, is again lost by further atrophy of the compressed tissues. Thus the procedure and process of tissue change continue, the excessively tight fit from tissue compression failing in any and all cases to prove of permanent benefit.

It has been my purpose to carry two cases as far as conditions seemed to justify. And it is believed that the principle of compressing tissues for valve seal by repeated rebasing was carried to a point never before equaled and possibly never approached.

One case, a full upper and lower, has just been completed, for the time being, with the ninth upper denture and the fifth lower denture. This case was treated and under observation for a period of three and one-half years.

The second case, a full upper denture, has just been completed, for the time being, with the twelfth denture, the case having been under treatment and observation for two years and eleven months.

It is the experience gained upon these two cases, as well as all others in a lesser degree, that the statement is made that a permanent tight fit cannot be maintained by compressing tissues, and that

ultimately the bony structure of the jaw also begins and undergoes disintegration. In both cases, the upper anterior ridge, originally hard and firm, has, in the last year, materially wasted away, due to interfering with circulation to the parts.

The following opinion upon this question was received from Arthur E. Smith upon request:

In compliance with your request with reference to question asked me, namely, "What causes continual shrinkage of the oral tissues after the insertion of dentures?" I beg to submit the following, after giving the subject serious consideration and study:

The alveolar process is spongy and porous, being a specialized form of bone. Following the removal of teeth there is partial absorption of the alveolar ridge due to gradual closure of the sockets and the destructive action of the osteoclasts. In the upper jaw the alveolar process extends from the inferior surface of the body of the superior maxilla below the level of the palatal process. Complete closure of the alveolar sockets takes place in from one to three years, provided the sockets are not infected. The major part of contraction of alveolar ridges takes place within eighteen months, so that a radiograph will usually reveal a uniformity in bone density. The alveolar process may be reduced to the level of the plane of the palatine process.

The function of the alveolar process is for the formation of the arch and for the retention of the teeth, and after the teeth have been removed the process is functionless as far as the teeth are concerned. Atrophy results due to loss of function of the alveolar process and adjoining true bone caused by a cessation of use thru the medium of masticatory apparatus. After the teeth are removed, there is a complete change in the structure of the alveolar process. It loses its cancellous texture and becomes hardened and assumes the texture of compact bone. I wish to call your attention to the fact that a change which is identical to that just described takes place in the alveolar process of a child, who has had teeth extracted.

As age progresses, there is a deficiency in the assimilation of lime salts to supply the demands of bone. This diminution is gradual and progressive with age. A striking example of this is a fracture of the head of the femur. When a fracture occurs at this point in an elderly individual, it will not unite due to deficient circulation and a deficiency in lime salts.

As age progresses, bone repair takes place very slowly and is practically nil in some locations, which can be accounted for by a deficiency in circulation and by a deficiency in lime salts. The head of the femur actually becomes smaller as age advances, which is a striking example of what occurs in the region of the alveolar ridge and adjoining bone.

As age progresses, there is a gradual change taking place in the arterioles, known as arteriosclerosis. This sclerotic change in the blood vessel walls of the arterioles interferes with the proper nourishment of the surrounding tissues. This sclerotic change takes place in the vessels supplying the jaw and the smaller ones possibly becoming entirely obliterated. Therefore, the alveolar process and adjoining true bone does not receive the proper nourishment and as a result a gradual and progressive atrophy takes place.

It is a well-known physiological fact that if continual pressure is exerted upon any part, it will cause a thinning and wasting of the tissues. An example of this would be the wearing of a truss. The skin and subcutaneous tissues, where the truss is applied, becomes very thin. A tightly fitting denture in close contact with the mucous membrane will in time become loose, and this condition I contend is caused by the changes in the bone and soft tissues, as described above.

Briefly summing up the factors which cause the condition so often noticed by dentists, they are: (1) loss of teeth; (2) loss of function of the alveolar process; (3) with loss of the teeth and therefore loss of function of the alveolar process, osteoporosis and sclerosis take place; (4) pressure upon the soft tissues causes, first, anemia and, second, atrophy; the soft tissues are eventually greatly thinned out by this process.

What are we accomplishing in compressing tissues for valve seal for tight-fitting dentures?

After consistently believing in and practicing such procedure, using all the materials and technics for impression taking known to me, I do not believe such procedure, as a general practice, to be a good one. Too many of our patients are unhappy and dissatisfied in the end

with the service we are rendering after such practice. Furthermore, we are making for ourselves an endless amount of work and limiting our peace of mind and happiness in our work.

Some cases may be improved by compressing the tissues and rebasing up to a certain point with a final refitting without compressing the tissues, aiming only to secure adaptation for retention mainly by adhesion and cohesion. Such treatment increases the base and peripheral area of the denture.

The ultimate result, satisfactory or unsatisfactory, as viewed by the patient is the determining factor indicating such procedure rather than the case itself. If a patient is to compare the final result with that enjoyed before the valve action of the soft compressed tissues is lost, and cannot be made to understand that the initial abnormal tight fit cannot be maintained, then the procedure is not advisable. My experience has been that few patients see anything but the loosening of the denture and seem to possess no understanding nor appreciation for any improvements made in their case by such treatment.

Conclusion

A well-adapted denture, without compressing tissues, that fits moderately well has proved the desirable plan in my practice and I have found myself returning more and more to the original impression technic given in the straight compound tray and plaster without peripheral *pressure* and *post-damming*.

Discussion

George S. Monson, St. Paul, Minnesota: As Dr. Hall has outlined, there have been many ideas concerning impressions of edentulous mouths. I think perhaps the greatest mistake in trying to solve the impression step in our work has been because of considering the impression as a step distinct from all other steps in denture construction. In other words, the impression must be tied up with the finished occlusion.

My early thoughts in these matters were based almost entirely upon the physics and mechanics applicable; I therefore discarded plaster because of the fact that it gives us merely a passive impression. We need an impression of the seating area for our dentures that will displace equally all tissues under a like pressure. This we can obtain by applying our knowledge of physics. A material should be used which when seated by pressure in the center of the carrying cup will be equally seated on all of the seating area. To this, we must tie our mechanics used in constructing our occlusion because our impression is really the base to carry this occlusion. To these, physics and mechanics, we must add anatomy, physiology and pathology. Pressure, whether from a tight rimmed denture or malocclusion, must produce tissue change. And in this same regard, let me call attention to a like condition brought about by too much post-damming, especially when carried into the soft tissue posterior to the hard palate.

Russel W. Tench, New York City: Dr. Hall is correct in his contention that it is possible to construct dentures with too great retention. Many such have been constructed due to enthusiasm for "tight fit," unguided by a proper consideration of the physiological factors that determine which degree of retention will be tolerated by nature for a reasonable length of time.

Extreme retention is developed in impression technic, either by too great compression of soft tissue supporting the denture, or by over-extension of the borders of the denture.

Over-compression results from the manner in which the material used for making impressions is manipulated. If the impression is taken with material at a working consistency so stiff that much force is required to adapt it to the ridge, the mucosa may be compressed until normal circulation cannot exist. The same result may be obtained by building up an impression by successive additions of soft material, or by the use of soft material confined in a close fitting, peripherally sealed tray.

Interference with physiological function results in atrophy, which destroys the retention.

Extreme retention may also be obtained by extending the margins of the denture into zones normally occupied by muscles when contracted in function. This results in intermit-

tent interference with circulation, as well as in intermittent pressure on the denture from the contraction of the muscle, both of which accelerate resorption and destroy retention.

When a "tight fit" can be obtained without too great compression of normal soft tissues underlying a denture and without overextension of the denture to zones of muscle action, it will not be temporary, if the patient is not afflicted with a constitutional or a local disturbance that may cause further wasting of the alveolar ridge areas, regardless of whether the dentures are worn or not. All the retention that will be tolerated by the tissues of the mouth is desirable, for it assists patients in learning to wear dentures and gives them confidence when appearing in public.

A "tight-fit" obtained under such proper conditions will not in any way compare in degree of tightness with the fit that may be obtained by over-compression or by over-extension, singly or together. It will usually permit an upper denture to move very slightly in a lateral direction, but will insure sufficient retention to permit incision and the exercise of all normal functions without unseating the denture. In a lower denture it will result in somewhat more rigid stability and retention than in the upper.

It is best to enlighten patients on the factors that determine the life of retention of dentures. I prefer to advise my patients that most of the "tightness of fit" will be lost in six weeks, that during this period they will have the advantage of this retention in aiding them to master the use of their dentures. Only in rare instances is the "fit" lost in that time, but the psychology of such advice is more favorable than if the patient is allowed to conceive the incorrect idea that a denture must always fit as securely as when first inserted. In time, the fit may be noticeably less perfect than at the start, but it will not affect to a degree that impairs the value of the dentures.

Post-damming is more often *overdone* than properly done. When correctly employed, it increases stability in the acts of incising and during forceful speaking, and prolongs the usefulness of the denture.

Success in impression technic requires a proper appreciation of the physiology and anatomy of the areas involved, together with a knowledge of the characteristic action of muscles bordering the dentures and simple mechanics.

DIAGNOSIS, CLASSIFICATION, AND TREATMENT OF VINCENT'S INFECTION

By JOHN L. SMELTZER, D.D.S., Atlanta, Georgia

(Read before the Georgia State Dental Society, Macon, Georgia, June 8-10, 1921)

AS WE all know, the so-called Vincent's angina, which I have termed Vincent's infection, is nothing new and the bacteria causing the infection are the same today as when Caesar was a boy except that we are just finding out a little more about the infection, for it has become more prevalent the last few years in the mouth, involving the entire mucosa and destroying the alveolus surrounding the teeth; hence the dental profession has been made to shoulder the responsibility for treatment. The fusiform bacillus was discovered in the tonsils and throat by Vincent in 1896, Paris. Prior to 1914 the fusiform infection in the mouth was very rare in France, England, and other European countries and was seldom heard of in America. In September, 1914, I had my first cases and experience with the treatment of Vincent's infection as a mouth infection. However, the cases were very mild indeed, compared to those we have had the last four years. Nevertheless, it appeared so severe at the time that I feared if I could not find relief for my patients very soon the result would be most disastrous. After much difficulty and discussion, I finally consulted an eye, ear, nose, and throat specialist who diagnosed the cases as Vincent's disease and helped me treat the patients. My first severe case was three years later, shortly after entering the army, June, 1917. The case history is as follows:

Private H presented himself to the Army Dental Corps for treatment with some mouth infection which we could not diagnose and therefore called pyorrhea. However, it was Vincent's infection but it was so different from any case I had treated before that I did not recognize it. His breath was dreadfully foul. The buccal and lingual plates of the alveolus were practically destroyed and the teeth hopelessly lost. He was suffering pain and discomfort. His health was below normal; his complexion, pallid and yellowish; glands in neck slightly swollen; had loss of appetite, and was in a depressed state of mind. It was a typical case of Vincent's infection in the advanced stage. He was not able to do duty as a soldier and because of his odor and because the army was short of tentage at that time, his commanding officer made a special request that he be discharged for the good of the service. Experience later taught me that this patient had had the fusiform bacillus infection.

During the last four years, I have had under observation and treatment, approximately two thousand active cases of Vincent's infection in the oral cavity. I do not mean cases that just showed the organisms, but real active cases. I shall endeavor to make clear the bacteria causing the infection. Microscopic examinations show the causative agents to be the fusiform bacillus and spirochete, which are almost always found together. Some bacteriologists even doubt whether the fusiform bacillus and spirochete cause Vincest's infection; they think it is some form of cocci because they are

always found in great numbers where the infection is thriving. In all the cases I have treated in the past few years when I freed the mouth of fusiform bacilli and spirochete, the infection cleared up immediately and the cocci perhaps showed in great numbers during the process of repair. These cocci, however, did not delay the clearing up of the infection. Immediately upon allowing the fusiform bacillus to be present again, the field of infection would become inflamed again. I do not want to convey the thought that only these fusiform bacilli and spirochetes are found, for along with these are found the streptococcus pyogenes, staphylococcus pyogenes, albus and aurus, and sometimes the pneumococcus, and various other organisms. If the smear is made from the throat or posterior palate, the diphtheritic bacillus is found occasionally.

Some claim that smoking is the direct cause of prevalence during the late war. I beg to differ on this question. After a close observation of one hundred cases, it was found that 37 per cent of this number did not smoke at all and only about 20 per cent had toothbrushes, and, from indications in the mouths, the toothbrushes had not been brought into action very often. I have made it a rule to allow patients suffering from this infection to smoke if they desired and I have not noted any handicap in the treatment as a result of the smoking, but of course I do not claim it to be an advantage. After four years of close observation of this infection I can offer three real causes for the increased number of Vincent's infection during the late war: (1) it is estimated by good authorities that we have many millions of carious teeth in America, which means great numbers of unhygienic mouths; (2) the diet plays as important part in the cause of this disease; (3) the greatest factor is the insanitary condition of the mouth, due to the improper manipulation of the toothbrush, which really is the key to the situation and would have solved the whole problem. Of all the cases of Vincent's infection that I have observed, not more than 15 per cent or perhaps less show any indication of honest efforts with the toothbrush. Therefore the whole question hinges on this very important point, for the fusiform bacillus is both a parasitic and saprophytic bacterium, and, before attacking the healthy tissues, it must have some avenue thru which to enter and cause a field of infection, such as unhealthy wounds, inflamed and irritated conditions in the oral cavity, decomposing food debris, and unhealthy and unhygienic mouths. When all physiological functions are normal and the oral cavity is kept in a perfect hygienic condition, and the gum tissue firm and healthy around the teeth so that there is no field for infection of the fusiform bacillus, the chance for this infection is very slight indeed. The fusiform bacillus in cases of inflamed irritated gums, such as gingivitis and stomatitis, is the direct cause in a large percentage of cases of pyorrhea, and it later becomes a mixed infection. In the examination of approximately one hundred and fifty cases of pyorrhea of different types and stages, we found that 40 per cent contained the fusiform bacillus and spirochete. However, the patients did not necessarily have to have Vincent's infection as the organism was of a quiescent type. We also occasionally found the pneumococcus, yet the patient did not have pneumonia.

If a patient recovers from the acute stage of Vincent's infection but is not carefully and scientifically treated and the proper hygienic methods pertaining to the oral cavity properly applied, he most likely develops a chronic type of Vincent's infection associated with and resembling pyorrhea in clinical appearance. However, it is a mixed infection and is often treated as pyorrhea without the desired result, in which case the

patient loses the teeth within a period of twelve to fifteen months, during which period he is most uncomfortable, run down in health, and presents a general debility.

The following is the history of such a case. Mr. C, age twenty-six, became infected while at duty in Norfolk. The infection first appeared in 1918, and after suffering pain and discomfort thru the acute stage he developed the chronic type (which I will term later as class 4) which lasted approximately fifteen months and finally destroyed his gums and alveolar process. He is now wearing a full upper and lower denture.

Vincent's infection may present different clinical appearances, types, and forms of infection in the oral cavity. It appears on the tonsils and posterior palate as a deep ulceration; on the ramus of the jaw posterior to the last molar, as a localized ulcerating patch; as a general mouth infection, it involves almost the entire mucosa and at times the tongue, or it remains limited to the gums. The cheeks and lips present a somewhat different clinical appearance from the other parts of the mouth. The infection is in shred-like patches with very painful and sloughing serpiginous ulcers, creamy-like in appearance, and often adherent to the membrane, sometimes resembling a malignant growth. The ulceration may be superficial or deep-seated and very destructive, covering a large area. This type is very painful and will cause a high temperature, usually 103°, but there is not so much swelling in the glands of the neck.

Of the cases of Vincent's infection in the mouth 65 per cent make their first appearance around the gingival margin of the gum, on the lingual surfaces of the upper anterior teeth. Effective treatment should begin at once for the great penetrating and very destructive power to the entire mucosa, pericementum, and periosteum causes necrosis of the interproximal septum and extends into and destroys the buccal and lingual plate of the alveolus. If not treated scientifically in the early stage of the infection, it means disfiguring the mouth, wrecking the general health of the patient, loss of all the teeth, and even death may occur as a direct result of Vincent's infection in the mouth.

The following paragraph has been written by one of our leading men in the dental profession today and of whom we are all very proud, Thomas B. Hartzell, of Minneapolis.

CASE REPORT

Patient male, age thirty-seven, ticket collector at a theater. First seen with Dr. S. P. Rees at the Swedish Hospital of Minneapolis, September 30, 1912. Was apparently well and working up to three weeks before entering the hospital. Had a chill and could not work as he had previously done on account of a feeling of general malaise. Examination revealed a case of fusiform bacillus infection around the upper central and lateral incisors about which there was a deep slough, gray in color, and reaching almost to the root ends.

While in the hospital, patient ran a temperature from normal to 104° in the afternoons. His pulse ranged between 100 and 135. Leucocyte counts ranged from 5,800 to 2,600. The clinical treatment of this case in the hospital consisted in the extraction of these teeth and light packing of the wound with iodized cotton. Patient rapidly grew worse and died about seven weeks after the onset of the infection. Blood culture was done by Dr. W. P. Larson and the resultant growth kept under observation for one year by him. When grown under excellent conditions the germs maintained the fusiform shape. When grown under conditions inimical to them, the bacteria relapsed into spiral forms and when these thread-like or spiral forms were placed under more satisfactory conditions for growth, their progeny returned to the fusiform shape. This suggests that the taking on of the spiral form was an evidence of degeneration or decrease in the vitality of the culture. A study of this case and literature[1] by Dr. W. P. Larson and Moses Barron is authority for the statement that this is the only case on record previous to the year 1912 in which the fusiform bacillus has been isolated from the blood stream.

Intravenous injection of salvarsan or neosalvarsan is advisable in certain

[1] *Jour. Infec. Dis.*, XIII (November, 1913), 429-37.

cases, if the patient is likely to have the fusiform bacillus in the blood stream or if the vitality of the patient is below normal. However, the intravenous injection will not clear up the infection in the mouth at any stage of the case. A small percentage of patients after having taken salvarsan develop an acute case of Vincent's infection. They, doubtless, already have the quiescent type of fusiform bacillus present in the mouth and the action of this intravenous injection seems to irritate or stimulate the organism in the mouth and a fusiform infection develops. Therefore it is not unwise to watch the mouth of patients very closely who are receiving treatment for syphilis and every precaution in hygienic measures should be forced to the limit in the oral cavity. More conclusive evidence of my opinion was noted July, 1919, when I was on temporary duty in the southern part of France in a segregation camp where several hundred venereal patients were being treated. I observed very closely that a large percentage of the syphilitic patients developed Vincent's infection and it was not all due to insanitary conditions in the camp. I do not object to the intravenous injection of salvarsan in certain cases where indicated, but by all means the local treatment of the oral cavity must be carefully administered.

Private D, camp hospital, A. E. F., February, 1919, was presented for treatment. He was carried into the office on a litter. I have never seen such a horrible infection of the mouth. His neck was swollen and almost as large as his head. His lips were swollen and turned out, cheeks swollen, saliva pouring out of the corners of his mouth, the entire mucosa practically involved, and there was breaking down and sloughing of the tissues and necrosis of the alveolus until the lower third of the roots of his teeth were exposed. The breath and odor from his mouth were extremely foul. Great pieces of sloughing tissue were present in the mouth. The patient was running a temperature of 103° and was suffering dreadfully with pain so that he could not sleep and occasionally had chills. His field hospital card showed his having had five injections of "606." In talking to this patient in regard to his history, I found the infection had first appeared in the mouth and I classified it as class three infection (which class I will describe later). I doubt seriously if he had ever had syphilis, for experience later proved that out of a large number of patients examined for Vincent's infection, approximately 23 per cent showed double plus Wassermann. However, five days later I extracted two teeth for this patient and he developed a hemorrhage. I was advised later unofficially that this patient died. I do not advise extracting the teeth in cases of this type but they were just hanging in the gum.

The following case may be of interest. Private M, either had been or became infected with Vincent's infection while on a convoy. He advised me that they all washed their mess kits in the same pail of water. The officers and some of the men on this convoy became infected. They returned to their battalion and all of the officer personnel became infected as well as many men in the battalion, and some of them lost their teeth as a result. I extracted part of Private M's teeth by just pushing them over in his mouth with my thumb, as the alveolus was entirely gone. Every precaution should be used in the treatment of these patients and they really should be isolated. It is the duty of the dentist to go into detail in explaining just how infectious this disease is. One cannot be too careful. It can be transmitted easily by using spoons, knives, dishes, drinking cups, kissing, using the same towel, and in any way coming in contact with the bacteria in the mouth. Of course, it is not necessary for me to advise the importance of

sterilization. A gauze mask should be worn by the operator at all times during the treatment as I have records of having treated some operators for the infection who no doubt had come in contact with the bacteria from the mouths of some of their patients.

One active case can injure a large number of people who happen to be associated closely and in a very short period of time. This situation occurred in one of our Allied Armies in 1915 because all were drinking from a water spigot on a company street. At another time there were as many as five hundred Russian soldiers infected in ten days in the German prison camps, which no doubt was due to their diet. These Russians were associated with the Germans but the Germans did not become infected so easily.

Mr. S had suffered continually with severe pain in the face, slight chills, a temperature of 103°, in addition to loss of sleep, loss of appetite, and loss in weight. The systemic reaction is severe and wrecks the general health of the patient. (This will be termed class three Vincent's infection.) The mouth was cleared of the infection and the patient dismissed in four weeks.

Mr. C claimed he had this infection only one week. His temperature when first seen was 100½°. His complexion was not good and he was suffering much discomfort from the mouth. He had consulted nine dental surgeons, no one of whom diagnosed his case as Vincent's angina. The large spaces between the teeth were due to his having been treated with an escharotic, which no doubt destroyed the bacteria as far as it went, but it also destroyed the peridental membrane and periosteum and interproximal septum, and these cannot be restored even tho the infection is under control. All escharotics are contra-indicated in this class of infection, as the result is sure to be disastrous, for when the tissue is once destroyed, the loss is irreparable.

This infection is not confined especially to the male. I have records of several high type of women who had this infection. However, they have all been mild cases, due to the fact that they presented themselves for treatment when the infection first made its appearance; also, the teeth and the mouth showed indications of the use of the toothbrush.

Mr. M presented himself for treatment on September 10, 1920. The diagnosis showed that he had an acute case of Vincent's infection. Treatment was begun and much time taken in explaining to him the necessity for using precaution. Nevertheless, Mrs. M came in about ten days later suffering much pain and discomfort from a severe case of the same infection. She likely had been infected before this advice was given Mr. M. Her case responded to treatment quickly and she was discharged within ten days. But Mr. M's infection already had pyorrhea and the Vincent infection practically around every tooth; there was also a deep-seated infection on the right cheek from the corner of the mouth extending back and surrounding the upper third molar. It spread with rapidity in spite of all that could be done with surgical treatment, local applications, mouth washes, and a general treatment, including diet. About the center appeared an angry, sloughing, serpiginous ulcer, very adherent to the membrane and resembling somewhat a malignant growth. Face and right side of neck were swollen for weeks. The patient had a pallid color and ran a temperature each day from normal to 103° but did not have the characteristic odor, which no doubt was due to the constant treatment and to the high resistance of the patient. After seeing the patient three times a day for some weeks, it was two months before he was discharged. I might say that most cases take from ten days to four weeks.

When it is determined that the pa-

tient has Vincent's infection, no matter how mild it may be, it is advisable to give him some general treatment in addition to the local treatment in the oral cavity. I would suggest a strong laxative at least, and, if the patient's condition will stand it without disturbing the system too much, a cathartic is beneficial and it should be followed each day with a mild laxative if necessary. If the case is severe the patient must be put on a light diet, omitting meats and other heavy food. It is advisable to give something for the blood. I have used a saturated solution of iodide of potash, beginning with five drops and increasing it by one drop each day to twenty, and continuing it for two or three weeks. However, one must use his own judgment about the blood tonic to be used. I have also used Fowler's solution of arsenic, beginning with three drops, three times a day and increasing it by one drop each day to seven drops, and then discontinuing it.

Vincent's infection in the mouth presents four distinct and well-defined types or classes of infection for clinical appearance. Each class presents a characteristic all its own and the clinical appearance in each class changes somewhat, depending upon the severity of the case, duration of the infection, and the unhygienic condition of the mouth. Each class determines its location in the mouth and type of infection.

Class 1 may appear on the cheek, lip, buccal mucosa, or the tongue. However, it is not frequently found to involve the tongue. This class presents an entirely different clinical appearance from the other parts of the mouth but is very easily controlled if taken in time. The early stage of the infection presents itself in small patches on the mucous membrane superficially, grayish-white in color; when removed, it presents a raw, bleeding surface extremely painful and sensitive. This type usually spreads very rapidly, and if neglected for a long time it may result in a general mouth infection. This class of infection may become deep-seated upon the cheek or different parts mentioned if the operator loses control of the infection, and the result may be very serious, involving a large area of the mucosa, the rapidity depending much upon the resistance of the patient and the hygienic condition of the mouth. It forms shred-like patches, creamy-like in appearance, very painful, and sloughing serpiginous ulcers very adherent to the membrane; it almost resembles a malignant growth in appearance. The patient very likely has a high temperature, quite a bit of swelling in the face, perhaps involving the neck slightly, but he does not suffer the great systemic reaction, unless one or the other classes of the infection is involved. If allowed to become severe, it usually associates itself with Class 3 infection, and becomes a general mouth infection. This class in the early stages might be mistaken for mucous patches as a result of syphilis, yet one who is familiar with Vincent's infection can readily note the distinct difference in the clinical appearance. The time to check this class of infection is while it is superficial. The mouth should be well sprayed with antiseptic mouth washes and the oral cavity freed as much as possible of food debris, salivary calculus; the field of operation should be as clear to prevent the infection from spreading over a larger area, but clearing the field of infection must not be overdone. For treatment, cotton rolls or napkins should be packed in the mouth to keep the surfaces as dry as possible. All superficial whitish membrane which exposes the raw, bleeding surfaces should be removed with a pledget of cotton in the pliers. As this class does not involve the interproximal septum and alveolus along the gingival margin it is possible to use escharotics if handled with any degree of precaution, such as nitrate of silver, phenol,

aromatic sulphuric acid, trichloracetic acid copperous sulphate, or any drug, even tho it is somewhat destructive to the tissues, without any serious results. A powerful escharotic should not be applied on these tissues in this class of Vincent's infection, but the surfaces may be painted with a small pledget of cotton and Fowler's solution of arsenic, or Fowler's solution of arsenic and wine of ipecac in equal parts. A 20 per cent solution of argyrol may be used, but the use of any particular drug effectively depends upon the severity of the case. If it is deep-seated, presenting the angry sloughing ulcerous appearance, the surfaces should be dried in the same manner and a 7 per cent chromic acid used, and after ten minutes, the surfaces should be painted with tincture of benzoin compound, which relieves the pain caused by the chromic acid and has a soothing effect. Neosalvarsan might be used mixed with glycerin and painted on the surfaces involved with a small pledget of cotton. Within the last few months, iodin and creosote have been successfully used in this class of Vincent's infection but it has not been a success in the other classes of fusiform infection. While in France, where I could not get the drugs desired, I resorted to tincture of ferric chloride. While I do not recommend it especially, as it affects the teeth and causes discoloration of the cementum, yet it accomplishes results in severe cases. I used with this a saturated solution of chlorate of potash as a mouth wash. Excellent results in most any class of infection may be obtained by painting the surfaces with perborate of soda, mixed with water to the consistency of cream. It may also be used as a mouth wash, a teaspoonful to a glass of water.

Class 2 is not so severe and usually appears on the posterior palate as a deep ulcer and does not spread over such a large area nor so rapidly. It usually appears between the uvula and the last upper molars on either side of the mouth. This class might be mistaken for diphtheria. However, there is a distinct difference in the clinical appearance to anyone who is familiar with Vincent's infection and diphtheria. It may be treated with almost any class of escharotics and results achieved without serious destruction to the tissues. Nitrate of silver and phenol have been used very successfully. However, 7 per cent chromic acid will give excellent results and will not be so drastic. Neosalvarsan may be painted on the parts infected. Any drugs mentioned in Class 1 may be used successfully.

Class 3 infection, which is the most common and attracts the close attention of the dental surgeon, is the most serious. It involves the gingival margin and the gum around the teeth and there is general destruction of the interproximal septum and alveolus. Approximately 75 per cent of Vincent's infection in the mouth comes under this class. The rapidity with which Class 3 spreads and becomes a deep-seated infection makes it the most treacherous and hard to control. It usually makes its first appearance around the gingival margin on the lingual surfaces of the upper anterior teeth causing swelling and inflamed condition of the gingival tissue. It can be recognized easily, as it appears in a sort of hypertrophy of the gum and the gingival line presents a grayish-white sloughing appearance. When this is removed, it also presents a raw bleeding surface. The rougae near the teeth become very tender and highly inflamed and extremely painful on touch. If the case is acute, it works with great rapidity, extending thru the interproximal spaces to the labial margins of the gum and forms deep pockets in the interproximal septum. This sometimes results within two or three days. It also appears frequently on the ramus of the jaw posterior to the last molar and this also is quite serious, for it most likely involves the

throat. In these cases extractions should be postponed until the acute stage has subsided. If effective treatment is not begun along the gingival border immediately, it penetrates the deeper tissue, destroys the pericementum and periosteum, causes necrosis of the interproximal septum, extends into and destroys the buccal and lingual plates, the glands of the throat become swollen, there is loss of appetite, and usually the patient runs a temperature and has chills. The swelling is caused by the toxins being absorbed in the glands from the infection of the mouth and along the alveolus. One should not attempt to operate on the glands of the throat in search for pus; neither should there be any extracting at the early stages, and the curetting must not be overdone in clearing the field of operation. The patient as a rule cannot stand the severe pain produced by instrumentation and the system cannot endure any additional shock.

After the field of operation has been cleared with due precaution, cotton rolls should be packed around the teeth. An applicator should be used with the tip wrapped in cotton or, much better, a broach wrapped with cotton, and with a light pumping motion the drug should be put well into the pockets, absorbing the excess with cotton rolls or napkins. Neosalvarsan mixed with glycerin and painted on the infected surfaces can be used with good results in most any class of the infection. Good results can also be obtained with 7 per cent chromic acid. While chromic acid is considered to be an escharotic, yet 7 per cent has not proved destructive to the healthy tissue but it should be used with some degree of precaution. I would advise packing cotton rolls around the area to absorb the excess. In using the chromic acid, the patient's mouth should be kept as dry as possible for five or ten minutes, and the surfaces of the mouth then painted with tincture of benzoin compound. I have used Adam's treatment very successfully in some of the milder cases.

The Adam's treatment is applying Churchill's tincture of iodin on the parts affected and immediately applying 10 per cent nitrate of silver on the iodin while it is still in solution, which forms iodide of silver. However, this has to be done most carefully to bring about the right chemical reaction, or the nitrate of silver will prove most destructive to the soft tissues and the iodin will penetrate the deep tissue, causing the fusiform bacillus to become more active. Iodin solutions alone prove very penetrating and irritating to the fusiform bacillus and the spirochete. Iodin crystals in beechwood creosote, often used in the treatment of pyorrhea, has proved a failure in my hands in treating this class of Vincent's infection. Fowler's solution of arsenic and wine of ipecac in equal parts applied in the same manner as stated above in the milder cases will prove most satisfactory. Fowler's solution of arsenic used alone will secure results in certain classes of infection, but due precaution should be taken at all times to keep cotton rolls or napkins packed well around the parts to absorb the excess of the drug. Perborate of soda painted on the tissue and in the interproximal spaces will prove successful in most any class of infection. However, if the parts involved become deep-seated, it produces much pain when first applied, but there will not be any question about the results. It is well to use Dakin's solution at different times during the process of treatment and it is also advised as a mouth wash. However, if used alone, it will not clear up an active case of infection as it does not reach all parts of the tissues infected. Methylene blue in spite of recommendations will not cure an active case of Vincent's infection. Normal salt solution, a saturate solution of chlorate of potash, listerine, perborate of soda in solution, hydrogen peroxide,

or any mouth wash containing antiseptic qualities is recommended. If the case is severe one-half of 1 per cent solution of nitrate silver should be used and retained in the mouth for one-half minute. All powerful escharotics which are destructive to the tissues to any great extent are contra-indicated at all times in Class 3, for if used the results are very disastrous. In this class, nitrate of silver solutions, trichloracetic acid, formalin, copperous sulphate, phenol, and all such drugs destroy the interproximal septum and cause a sloughing of the tissue around the gingival margin which gives the fusiform bacillus and spirochete a new field in which to work, and the interproximal tissues are rapidly destroyed.

Just one precaution is necessary after the patient is thought to be well or free from the infection. The patient should wash the mouth well with lukewarm water. A microscopic examination of the water from the mouth should then be made. That is an accurate way to determine if there are any fusiform or spirochete present. The patient should be observed occasionally for two months after the infection is entirely cured.

The treatment with autogenous vaccines has been a failure. The bacteriologists have difficulty in growing the organisms, which is due to the greater rapidity of the growth of the cocci group and the more profuse character of the growth in streptococcal and staphylococcal cultures which entirely prevent the growth of the Vincent organisms.

After Class 3 has passed thru the acute stage and allowed to continue, it develops into a chronic type which we will term Class 4. If the patient is not entirely free from the fusiform bacillus and the spirochete after treatment for the acute type, and the quiescent type of bacteria are allowed to remain in the interproximal spaces, it sometimes develops into Class 4 or the chronic type. After a short while, this type resembles pyorrhea in clinical appearance and is quite often diagnosed and treated as pyorrhea without the desired results. The destruction of the interproximal septum and buccal and lingual plates, follows and the teeth are lost within a period of from twelve to fifteen months. During this period the patient is in poor condition, characterized by loss in weight and a pallid complexion. One characteristic of the infection is that the patient is usually in a depressed state of mind.

This chronic type is very difficult to treat. It lingers long without producing very much pain but acts somewhat, if you will allow me the term, as quick consumption. If it is once well under way, the teeth are hopelessly lost.

Vincent's infection does not mean anything, for it may be gingivitis, pericementitis, or any other form of ulceration in the oral cavity, but by this classification one will know just the type of infection.

Vincent's disease is due to the rapid growth of the fusiform bacillus. Under ordinary mouth conditions, the fusiform bacillus is not destructive. When growing in conjunction with the streptococcus and the staphylococcus, enough tissue is destroyed to afford this organism its proper habitat—dead and dying tissue. In such an environment, the growth of the fusiform bacillus becomes very active and it becomes very pathogenic. Owing to the fact, however, that it does not penetrate living tissue to any great depth, its favored localities for growth are provided by filth upon the teeth. Because of its own lack of deep penetrating power, its eradication by topical application is almost always possible, the exception being those cases where deep pyorrhea pockets or broken blood vessels afford it a point for deeper entry.

DENTAL PREPAREDNESS FROM MEDICAL DEPARTMENT VIEWPOINT

By M. W. IRELAND, M.D., Surgeon General, United States Army, Washington, D. C.

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

I HAVE always been imbued with the logic that dentistry, with medicine and surgery, belongs to the great mother-profession, the healing art. I believe today it is probably the largest and certainly one of the most important specialties of medical science. History shows that from the very beginning those three salient factors of the healing art have largely been coexistent until about eighty-two years ago, when Harris and Hayden pulled away from the medical school of the University of Maryland, organized the first dental college of the world, and began the special education of students in dentistry as a separate profession. It is lamentable that for the next seventy-five years medicine and dentistry existed as separate professions and were more or less out of sympathetic touch. While each was striving for scientific attainment, and both were replete with achievements for the alleviation of human suffering, yet, unfortunately, they were completely dulled to an appreciation of what wonderful opportunities for the health and welfare of mankind lay within grasp of their co-ordinated activities.

The attainment of higher educational requirements, the developments in scientific study, the advancement in methods of teaching pathology, therapeutics and surgery, and finally the achievements made in dental and bacteriological research thru which was proved the value of oral focal infection as a factor to systemic diseases has, within the last few years, drawn the lines of professional thought together and made it manifest beyond peradventure that henceforth the two associated professions heretofore unhappily estranged, must proceed hand in hand for the attainment of that high ideal, the uplift and betterment of humankind thru the conservation of health, its greatest blessing.

The resultant blending of medical and dental thought along lines of mutual endeavor in the elimination of disease and the splendid results obtained from a military standpoint thru the service of dental officers during the world-war has undoubtedly produced a welding of the two professions that will endure and result in greater benefits to a grateful humanity.

From the broadened viewpoint of one of our country's public servants, it may not be amiss for me to invite attention to some of the salient features that have served to bring dentistry prominently to the fore during the past few years.

The splendid response of the dental profession to the nation's call to arms, wherein approximately five thousand

dental officers were enrolled, commissioned and entered upon active military service was an innovation that challenged public attention and secured for dentistry the long sought for stamp of governmental recognition. The professional service rendered by these officers very materially assisted the Medical Corps in conserving health and maintaining a high degree of physical efficiency with the five million men mobilized during the war. The stupendous achievements in constructive and restorative dentistry obtained thru the co-operative effort of twenty thousand patriotic members of Preparedness League of American Dentists is a proud feat worthy of emblazonment upon the bright shield of American dentistry. The record made by this organization shows that more than one million gratuitous dental operations were performed for volunteers and drafted men before they joined the colors. As an efficiently organized service for the dental preparedness of our soldiers for campaign, this great work of the members of your profession, located thruout the length and breadth of our fair land, stands out head and shoulders above others of similar kind and is a credit to the loyalty, patriotism and solidarity of your profession.

The splendid organization of the dental service in the home country thru which the dental profession was militarized and inducted into the army and thru which adequate dental personnel and high-class equipment was installed in the several hospitals, camps, cantonments and clinics was a vastly important measure and assisted greatly in the physical preparation of the large contingent of the American army for combat service at the front three thousand miles away over sea and land.

The organization of the Dental Corps in the American Expeditionary Forces upon purely a military status wherein the dental service was properly adjusted into its military establishment and merged into the professional activities of the Medical Department, and the assignment and development of dental officers as technical administrators for the supervision of its strictly technical service, resulted in the maximum of efficiency, and a highly satisfactory service for the army on campaign.

The special professional achievements made in face and jaw prosthesis which in conjunction with highly specialized plastic surgery has challenged the admiration of the world, has illuminated the fair name of American dentistry and brought forth into the limelight the names of Hayes, Davenport, Kasanjian, Potter, Blair, Ivy and others, and has surely maintained for American dentistry the world's supremacy heretofore granted it.

While thus reviewing the splendid war-time activities of American dentistry, I am constrained to take a broad view and include within that term the American dental manufacturers, to whom your profession owes much for the progress made and reputation won during the last forty years. I would not feel that justice had been done were I to fail in making public recognition of the faithful, wholehearted manner in which they with combined effort met the production situation of that period. It is a proud record that none of our valient fighting men at the front ever suffered from the lack of dental attention, due to any shortcomings on the part of the manufacturers.

Before entering upon a consideration of my special subject, I must venture a few words along the lines of general preparedness from the nation's standpoint. Personally, I am a strong advocate of universal military training thru which the youth of the land may be educated and trained to best meet requirements

in fulfilling the highest obligation of citizenship—the defense of the country.

When one stops to consider that of about 200,000 officers commissioned in the army during the world-war, only 17 per cent had previous military training and 83 per cent—practically four out of every five—had to be instructed even in the elementary fundamentals of their new calling and this while the war was actually on, the importance of training citizens in time of peace in order that there may be an adequate number of officers available for military duty in time of war seems to need no further recommendation and may well be taken as food for serious thought by all our people.

Thru the operation of a policy for universal military training we as a nation would reap double benefits, for in addition to the annual acquisition of a large number of serviceable young men basically trained and available for intensive advanced training and service with the colors, we will secure beneficial results for the individual so trained that will tend to improve the mental, moral and physical standards of our people. These results briefly may be stated as follows: improvement in general physical development thru regular exercise and by teaching the importance of outdoor life and proper posture; the detection thru physical survey of hidden conditions that might prove a decided handicap during the life of the individual if not corrected, such as hookworm, malaria, flat feet, focal infections, etc.; practical instruction in sanitation and personal hygiene that teaches how to care for one's self outdoors; education in sex relationship and venereal diseases; training in discipline and the development of respect for authority; protection afforded by vaccination against typhoid, paratyphoid and other diseases which can be avoided by inoculation. Since it appears that the will of the people is not sufficiently ripe to accept universal training as the solution of our great military problems for defense, it behooves us to foster and help develop the next best thing available, namely the voluntary Citizens' Military Training Camps and the Reserve Officers' Training Corps. Under the present plans the Citizens' Military Training Camps (C.M.T.C.) will be held annually. They are designated to furnish intensive instruction to civilians who cannot afford to devote more time to military training. The courses are divided into what are known as the red, white, and blue. Each course is of one month's duration covering the necessary practical training in camp. They all involve a certain amount of preliminary or supplementary reading on the part of the candidate at home. The red course is designed to train civilians who have never before had military service and to perfect them in the duties of the private soldier and for enrollment in the Enlisted Reserve Corps. The white course is provided for the training of graduates of the red course in the duties of a non-commissioned officer and for enrollment in the Enlisted Reserve Corps. The blue or last course is designed for the training of specially selected men from the red and white courses for duty as an officer and commissioned in the Officers' Reserve Corps. Owing to limited appropriations only about ten thousand citizens will be so trained this year, the majority of them being in the red course. Recently the President publicly announced his approval of this movement and his hope that eventually we would see about two hundred thousand youths of the land attending these camps.

Units of the Reserve Officers' Training Corps or as is commonly termed the R. O. T. C. are established only in colleges. Their object is the military train-

ing of students in conjunction with their college instruction that will lead to a commission in the Officers' Reserve Corps. As not all of the youths of our land have the privilege of attending college you will readily see why we have provided for a blue course in the C. M. T. C.

The Medical Department is in hearty accord with this great work of preparedness, as it is realized that the future strength of its reserve officers, for the three major corps, must come from this source where a prerequisite for a commission is a diploma in medicine, dentistry or veterinary surgery.

To more fully elucidate the Medical Department's application of the R. O. T. C., I shall explain that the Army Reorganization Act of June 4, 1920, made provision thru which medical, dental and veterinary corps units could be maintained in any Class A institution that could offer a minimum enrolment of fifty students in each unit. Soon after the passage of this act we began the formation of these medical department units. The response has been very encouraging and to date units have been established in eleven medical schools, five dental schools and three veterinary schools. All of the Class A dental schools of the country have been invited to co-operate with us in this course of military education and it is believed that a greater percentage of them will accept and enter upon the work with the beginning of the next session of school. These R. O. T. C. units will eventually constitute our principal replacement agency in keeping the reserve roster at a satisfactory level. Each graduate of the advanced military course will be given a commission in the reserve corps. If the majority of them join the reserve, it is estimated that they will provide an annual increment of sufficient size to take care of the normal replacements for both the regular and reserve corps and will more than offset our prospective losses. The schedule required is (*a*) a theoretical course to be given at the dental school during four calendar years comprising ninety hours of lectures or its equivalent each year; (*b*) a practical course in drill and field duties to be given at the summer camp of six weeks' duration during one of the students' vacations, preferably at the conclusion of his sophomore year in college.

Upon securing authorization for the establishment of a dental corps unit of the R. O. T. C. in a dental college, an officer of the Army Dental Corps is detailed to the institution as professor of military science and tactics. This officer is selected by the surgeon general after consultation with the dean of the college so that an officer suitable to all concerned may be assigned. In many instances it will be possible to send back a former student of the college as an instructor. The first two years of the R. O. T. C. course constitutes the basic course and the last two the advanced course. While the law requires ninety hours of instruction each year in medical, dental and veterinary schools, certain credits may be given for equivalent subjects embraced in the professional curriculum.

These lectures on military topics are presented in progressive fashion. While they deal with broad subjects concerning the organization and functions of the army as a whole, special stress is laid upon detailed instruction given to organization, administration, and functions of the medical department embracing the duties of the private, noncommissioned officer, and finally the junior officer. Illustrated lantern slide lectures and moving pictures collected during the progress of the world-war are extensively used. The student is not required to

wear a uniform or attend any drill or other military functions while at his professional school. He merely attends lectures on the subject of military science and tactics the same as he does with other subjects provided for in the curriculum. Upon being admitted to the advanced course to which the student becomes eligible during the last two years of his military instruction, he is paid by the government commutation of subsistence which amounts to about $15 monthly. Upon enrollment in this advanced course he must sign an agreement to attend one encampment of six weeks' duration during his summer vacation after completion of the sophomore year. This encampment will be held at the Medical Field Service School, Carlisle Barracks, Pennsylvania. There the student will be required to apply practically the theoretical knowledge he has gained thru his lectures at the dental college. The use of all units employed by the Medical Department in peace or war will be demonstrated to him and he will actively participate in their maneuvers. All expenses of the student in traveling to, from and while at the camp of instruction are borne by the government. In addition thereto he is given the pay of a soldier during the period covered by the encampment.

Under the present economic policy of our government based upon recent congressional enactment, the regular military establishment has been reduced to a minimum, the navy curtailed in its constructive program and depleted in enlisted strength, and the respective functions of the army and navy outlined as a sort of armed guard for the preservation of peace —afloat and ashore—with all spare time devoted to education and training of the national guard and organized reserves.

The three great essentials in military preparedness for the Medical Department are personnel, material and training. This applies equally to the medical, dental and veterinary service. With the subject of dental personnel we are fortunate in being able to announce a total of 3,763 officers now enrolled in the Dental Reserve Corps with representation in the grades of lieutenant colonel to first lieutenant inclusive. At the present ratio of one dental officer to one thousand men, this will provide dental service in excess for an army of three and one-half million men. It has been gratifying to note the happy response made by this large proportion of your profession and thus realize that the important dental service for the next great emergency will automatically be cared for by officers who have heretofore had valuable experience in the service during the world-war. We now have in storage depots sufficient Medical Department material including dental, for the first million men. This was laid aside from the vast surplus stores of nonperishable articles left from the Great War. All this type of field service equipment will be kept alive by frequent turning over so that any future emergency will find us prepared with an amount on hand sufficient for the requirements of the first phase.

From the standpoint of training it may be said that tentative plans have been approved for the organization of the Officers' Reserve Corps, which contemplates the classification of each officer as to his capabilities, special qualifications and efficiency, and tentatively assigns him to the position within his respective corps area that he should occupy. In this manner we believe it possible to avoid many of the gross errors of 1917-18.

The Act of June 4, 1920, reorganizing the army, divides the country into nine corps areas and each area has charge of the Regular Army, the National Guard and organized reserves within its boundaries. To provide the necessary Medical Department units for an emergency

force possible under this reorganization, we expect eventually to organize ninety evacuation hospitals, seventy-two surgical hospitals, three hundred and sixty general hospitals and numerous independent surgical teams, all to consist exclusively of reserve officer personnel. The assignment of dental officers under the present Tables of Organization wherein there will be one dental officer to each evacuation and each surgical hospital, and three at each general hospital, will absorb over one thousand two hundred dental officers in Medical Department projects alone. The Tables of Organization for line organizations now give twenty-two dental officers to an infantry division distributed to the various brigades, regiments, and commands thereof. On the theory that there will be one National Guard division and two organized reserve divisions within each corps area, we will thus have within the territorial limits of the United States twenty-seven divisions with a total assignment of five hundred and ninety-four dental officers. This will give approximately one thousand and eight hundred dental officers in the various grades for assignment to the different organizations accounted for in the General Staff plans for training the National Guard and organized reserve forces. The organization of a vastly expanded war time Regular Army will easily absorb the remaining reserve officers available for active field service who will be assigned in accordance with Tables of Organization.

The project of classifying, distributing and assigning the Reserve Dental Officers within each area will engage the attention of the several area headquarters within the next few weeks. The Surgeon General's Office will be able materially to assist in the assignment of dental officers in accordance with their grade, experience, service record and professional qualifications. It is hoped that sufficient study may be afforded this important work to make it reasonably sure that properly qualified men for the special positions will be carefully and satisfactorily selected. In this connection there appears to be little reason why every man should not obtain the very assignment he is best fitted for, or for which he is particularly desirous. At any rate it will be my intention that this shall be done wherever possible.

With Medical Department units it is planned that the larger hospitals will be formed substantially the same as the American Red Cross hospitals were organized prior to the recent war. Upon designating the commanding officer for one of these units, he will, so far as possible, be permitted to select from the reserve officers those whom he may desire as assistants or as members of the unit provided the men so selected are within reasonable distance of the place designated as the home for that unit. With such an organization completed it will be possible in the event of war for reserve officers, both medical and dental, to join without confusion the Medical Department unit to which they have been assigned.

The training of Medical Department units will not require serious consideration for some years. The senior officers will have had sufficient service during the recent war to prepare them for emergencies of mobilization. Dental officers having been selected in so far as practicable to join units with which they have heretofore served, or in which they are familiar with routine duties, will not be required to undergo the same type of service exacted of the newer and less experienced men who have not had that experience during the war. Adequate training, however, of selected personnel of the Medical Department units have been provided for at the Medical Field Service School, Carlisle, Pennsylvania.

Two years ago the War Department approved of the plan to make Walter Reed Hospital a great Medical Department teaching and training center. The Army Medical School, the surgeon general's library, and the Museum will shortly be moved out there and every facility will be provided to give complete technical training to medical officers. Plans are also under way for the establishment there of the Army Dental School, and it is fully expected that the same facilities for advanced technical instruction will be afforded dental officers as now are available to medical officers. New acquisitions to both corps will receive their initial technical training at this school; older officers will be brought back to receive postgraduate work; and National Guard officers and reservists will be given special technical courses. A very important step was made during the past few months when the War Department assigned Carlisle Barracks to the Medical Department as a field training center. This school was organized a few months ago under the administration of a specially qualified medical officer of superior rank and wide experience who has been given an ample size corps of instructors composed of specially selected officers of the medical, dental and veterinary corps. It opened for the first class of instruction on June 6, 1921, and has made a splendid record for the Medical Department. This institution is teaching all the features of sanitary tactics, supplemented by practical demonstration of every Medical Department unit provided for in Tables of Organization. It is here that the new reserve officer can secure his fundamental training and actually become familiar with the organization with which he will work in active service. It is pleasing to announce that the first class of undergraduate students from the five R. O. T. C. dental units were in attendance at this first session of the Carlisle School. With the several student officers of the Regular Dental Corps and the four retired student officers they constitute about 45 per cent of the enrolment at this first session, which is a very creditable showing for the dental service.

EDUCATIONAL IDEALS IN ACCORDANCE WITH THE ASPIRATIONS OF THE AMERICAN COLLEGE OF DENTISTS

By C. N. JOHNSON, M.A., L.D.S., D.D.S., M.D.S., F.A.C.D., Chicago, Illinois

(Read before the American College of Dentists, Milwaukee, Wisconsin, August 13, 1921)

AT THE first annual meeting of the American College of Dentists, it would seem appropriate to consider briefly some of the objects of the organization and possibly to make a few suggestions as to lines of policy. It goes without saying that there is a very real need for such an organization as this in the dental profession. In medicine we have in America the American College of Surgeons, and in Great Britain its prototype, the Royal College of Surgeons—both standing for the highest ideals in professional conduct and achievement. If these institutions are needed in medicine, with its centuries of history and tradition, ours is surely needed in dentistry at a time when we are in the midst of making history and creating tradition.

Our educational policies are undergoing such a rapid evolution that it is sometimes difficult to evaluate the new ideas as they are advanced from time to time, and today there is a very decided difference of opinion among men as to what will turn out practicable and utilitarian in our educational systems, and what will not. And it is natural that there should be this difference of opinion, because it is not within the power of any man to predict with certainty just what the effect will be on the future of dentistry of some of the proposed changes in our educational methods. But of one thing we may be sufficiently assured, that no matter what trend our educational policies may take, nor how perfect we may become in preparing young men in our colleges for the practice of dentistry, there will still remain the necessity of an incentive to stimulate men after graduation to such application as will insure their constant development toward higher and better things in the profession. Say what we may, the purest conception of professional ideals is never consummated in an individual in a college course. The colleges do well if they succeed in implanting the germ, and starting it on its way to growth. The man never gets the full realization of his professional obligations nor is he imbued with the sanctity of his calling till such time as he has been brought in close contact with the intricate problems of everyday practice, and been made to feel their vital relationship to the welfare of the people he serves. No man is worthy of recognized professional status till there has sunken into his very soul the deepest conviction of the moral obligation involved in professional life. The only way this

can be burned into his consciousness is by actual experience in encountering the suffering involved in disease, and by having the problem placed before him of relieving that suffering. Not till he has seen the drawn face of agony change under his ministrations to the peace and calm of relief is he in a position to fully appreciate the sacredness of his relationship to humanity, and the opportunities he has for the best kind of sanctified service.

The argument then is that no man ever attains to the highest conception of the science and art of dentistry until he has been distilled in the alembic of actual professional experience; and if this is true it follows as the day the night that, after all, the education which is the most significant is not that obtained during the college course, but the education which comes after graduation. No one can have a more profound conviction than I of the great importance and necessity of a college course, nor of the serious moral obligation placed upon every individual who aspires to be a teacher. It has been my chief contention for many years that mere ability to impart information was not the only *sine qua non* in a professor in a dental school, but that the thing which stood out with the greatest insistance as a prime requisite was that very tangible and definite entity called moral fiber. I, therefore, am far from minimizing the importance of college education, but I have grown to recognize the fundamental fact that the highest conception of professional achievement comes as a matter of later development rather than when the student is concerned chiefly with the problems of acquiring technical knowledge and skill.

It will thus be seen how very important I deem every movement which has for its object the stimulation of the profession toward the attainment of higher and better things, and this is why the organization of the American College of Dentists appeals to me so strongly. To create an incentive in our ranks which shall impel men to constant application along lines tending to the uplift of the profession is the very highest function which any body of men can undertake, and thus every right-thinking man should get behind this movement and help develop it to its fullest fruition.

But let it not be thought that it is a simple matter to launch this craft or to steer it clear of obstacles in the early stages of its voyage. In some respects it is the most delicate mechanism that was ever conceived in the dental profession, and it is well that its founders should gain a very clear idea of its objects and the real function which it is intended to perform. It should not be considered merely as "one more society." It is apart and distinct from every other organization in dentistry, and it should remain so. If it is to be an institution to which every sincere, earnest and progressive man would wish to aspire, it must not be cheapened in any way. Better by far to be considered too exclusive than too promiscuous.

Let us consider for a moment what the College is supposed to stand for. The object is to provide an incentive for men to apply themselves to the solution of the various problems which confront the profession, to stimulate growth on the part of dentists, and to encourage them to reach out for the higher and better things of professional life—in short, to create a class of men in dentistry who are not satisfied to stand still and be content with mediocrity, but who wish to consecrate themselves to the loftiest conception of all that is involved in the purest ideals of human relationship. The details of all of this are to be worked out by this honorable body itself, but, in the broadest concept of what we pro-

pose to stand for, it behooves us at this time to study most carefully every move that is to be made in the initial stages of our organization. It is so easy to make mistakes, and so difficult to remedy them.

One of the most vital problems presented for consideration in these early days is that of membership. No organization can be effective for the greatest good without a rather widespread membership, and yet herein lies the possibility of making the gravest of all errors. To get in men, even a few of them, who are minus the qualifications which should entitle an individual to membership in such an organization is to defeat the very object for which it was organized. And please remember that the task of assuming the responsibility of saying who shall and who shall not be admitted is the most difficult that was ever presented to a body of men in our profession. There are so many things to consider in admitting men to membership, and it just so happens that the very factors which are most likely to be instrumental in gaining certain men an invitation to membership are the ones of all others which should least entitle them to membership. Personal friendship always has and always will play an important fart in such matters, and yet it is not so very far-fetched to say that personal friendship has nothing whatever to do with the regulation of membership in this body.

If we are to consider "educational ideals in accordance with the aspirations of the American College of Dentists," then we must eliminate as far as is humanly possible the influence of personal friendship. That is, we must not recommend a man merely because he is our personal friend. If he has done something of distinction, and happens to be our personal friend, the combination is ideal; but his qualifications should consist in the things he has done, and not in his friendships. Merely to be a good fellow should not constitute a man eligible to membership in this organization.

There should be something outstanding and conspicuously praiseworthy in the achievements of every one seeking fellowship in the College, so that when the list of members is scanned it will at once command the respect and even the admiration of those who see it.

It matters not so much in what field of effort the candidate has won his spurs—the chief thing is that he has won them. It may be in research, in literature, in education, in legislation or in administration; but what he has done must have the stamp of superiority upon it. The College was not organized to encourage mediocrity.

Neither is its function to take men and develop them. This may seem a strange statement, but the present contention is that they should be started well on their way, and should already have proved not only their ability but their inclination to achieve something of definite value to the profession and to humanity before they are entitled to representation in this body. Not that the fundamental idea does not include the factor of growth and achievement after membership is gained—in fact, the hope is freely expressed that men will grow more surely and rapidly than before—but that there must have been demonstrated in the individual those qualities inherent in his make-up which have unerringly in the past driven him to the pursuit of such activities as will most surely redound to the benefit of the profession.

By this it is not meant that a man must of necessity have won all of his spurs and reached the point where he is in the mood to seek the chimney corner and rest complacently on his laurels. This is not an association emeritus. It is an association of workers—the hardest workers in dentistry; not content with the best that has been accomplished, however good it may be, but determined to

carry to greater and still greater perfection every activity which has for its aim a higher class of service to humanity. It should be possible to point to every man in this organization and say not only, "Look what he has done," but "Look what he is doing." In other words, there should be some definite reason why he is a member today, as well as why he was selected yesterday.

It will be seen by the foregoing that I have a rather exalted conception of what is involved in membership in this College, and there may be in the minds of some a feeling that there is too great an element of exclusiveness in my point of view. The contention may be made with apparent justification that we must have numbers in order to wield the influence for good which the founders so confidently hope for. Well and good—but after all we do not need great numbers in order to do great good, and a sufficient number of men to make this organization representative of the best thought in the profession may be selected without the inclusion of unsuitable material, if we but exercise the proper caution in this formative period of our existence. Men there are in our profession in adequate number to give us a note-worthy membership of sufficient size to exert a powerful influence for good. Why then assume the risk of placing our organization in jeopardy by too great haste, too much enthusiasm, or too little deliberation in making our initial selections? Better far to build slowly and surely and create an institution of which we will all be proud, and into which every ambitious man in dentistry, young or old, will be anxious to seek admission.

Today we have the opportunity of introducing into our beloved profession one of the most potent influences for good that has ever been organized. Let us rise to our possibilities and make the most of this opportunity.

THE BENEFITS OF A DENTAL ASSISTANTS' SOCIETY

By HEDWIG A. KIETZMANN,[1] Burlington, Iowa

(Read before the Dental Assistants' Section of the Iowa State Dental Society, Des Moines, Iowa, May 2-5, 1921)

SOMEONE has said we gain a person's friendship by service. One of the main reasons for organizing the society is for service—better service to your employer and better service to humanity. The purpose is to give and exchange ideas and methods so that we may become more efficient. We are helping our fellow-members to learn ways and means of giving better service and in return gaining new ideas from them.

There is much good derived from the exchanging of ideas. We learn helps, little time savers from one another, for example, the cutting of gold foil. The method in our office was to take one sheet at a time, fold together, and cut in desired sizes. When it had to be separated the majority of pieces stuck together. At the state meeting we learned that by putting a sheet of tissue paper between the leaves of gold, it did away with the sticking. Just this one item has been a very decided time saver in our office, and there are many such instances.

Then, too, sociability plays a large part in an organization of this kind. This was demonstrated by the visiting the assistants did among themselves at the meetings. To me sociability of thought is a great factor. I do not think any one of us likes to accept ideas or learn from those who are not in sympathy with our ideas or purposes. And of course we are all here for one purpose, that of becoming a more efficient assistant.

Some believe there can be no benefit derived when a dentist demonstrates an assistant's duties at the chair, for each operator works differently. Certainly they all work differently; if all worked alike there would be no need of dental meetings. None of you would join a study club if the same subject were discussed at each meeting. You have joined for the purpose of broadening your mind. The same applies to this organization for dental assistants. It would be foolish to come many miles to see your own employer's methods performed by another practitioner. Learn what others require of their assistants; then closely observe the proceedings in your own operating room to see where you can be of more help.

Shakespeare said: "There are books in the running brooks, sermons in stones and good in everything." If we only will there is always a chance to learn something and if we come to these meetings with that determination we are sure to return having gained something.

At the meeting in Cedar Rapids last May no smaller societies in the state were

[1]Associated with Drs. Chapman and Dana, Burlington, Iowa.

reported organized. Since then there are one district society, the South Eastern Iowa, and three city organizations, at Des Moines, Sioux City, and Burlington.

A few months ago the Burlington Dental Assistants' Society included in its membership the assistants of the practitioners of the city with one exception. Today there is no exception. This is an argument in itself. If there were no benefits derived there would not be so much interest and enthusiasm. The Burlington assistants are also members of the South Eastern Iowa. There is great interest shown in both societies. We have poured models, invested inlays, discussed sterilization and novocain preparation and many other things equally useful. And as far as I know Iowa is the only state in the Union that has an assistants' section in the state dental society. Let us make it a *success.*

RADIOGRAPHIC INTERPRETATION[1]

By JULIO ENDELMAN, M.S., D.D.S., F.A.C.D.

If it were possible to propound to every member of the dental profession the question as to which of various factors had been the most potent in drawing a tight line of demarcation between good and bad dentistry, we are inclined to prophesy that radiography would head the list with a respectable majority. It is interesting in this connection to note the progress which has been made from the time of its first application in dentistry to the present day, in technic and interpretation and in the greater cautiousness displayed in advancing opinions based on radiographic findings as compared with the venturesomeness characteristic of radiographic diagnoses of former years. Dark shadows have been and are even today, to quite an extent, the tottering foundation upon which are built diagnoses, at times, leading to the ruthless sacrifice of teeth. Instances have come under our observation in which the diagnosis of "dental granulomata" has been arrived at exclusively upon the evidence of a shadow in the neighborhood of teeth containing vital pulps. Likewise we know of cases in which teeth affected with a moderate degree of some form of pyorrhea alveolaris have been ordered extracted for the cure of a systemic involvement which had existed years before the advent of the dental affection. The interpretation of dental radiograms is by no means a matter of such simplicity as some are prone to have us assume and, further, any attempt at diagnosing mouth conditions on the basis of radiography and at the exclusion of other helps available in

[1]Editorial, *Pacific Dental Gazette,* September, 1921.

the detection of dental and oral conditions is a travesty upon the higher aims of dentistry and a light-hearted appreciation of the responsibility of its function. A radiograph per se is merely a record of densities in the structure of the teeth, jaws and attached soft tissues. The significance of these varying degrees of densities is the problem whose solution, in each individual case, must be arrived at with the aid of histology, normal and pathologic, and of anatomy, normal and pathologic, plus such other information as every conscientious diagnostician endeavors to obtain. The realm of dental diagnosis has been invaded by some whose training does not warrant them in assuming the right to dispense information on matters pertaining to the histology and pathology of the mouth and its contained organs. Neither the medical degree, nor the dental degree, nor the ability to produce radiograms are the sole requirements for entrance into the diagnostic field. The diagnosis of dental conditions demands a most thoro familiarity with dental histology and pathology and years of clinical observation of normal and pathologic conditions in the human mouth. The clinical examination of the mouth without a radiographic record is as incomplete as is a radiographic examination of a series of films without the clinical confirmation of such findings. The information on radiographic interpretation contained in books on the subject, of which there are several in existence, is most valuable, but only to those who by previous training and preparation are able to properly assimilate such knowledge. To the mind arid in matters of histology and pathology correct radiographic interpretation is an impregnable citadel.

THE JOURNAL of the NATIONAL DENTAL ASSOCIATION

Entered as second-class matter, March 22, 1915, at the Post Office at Huntington, Indiana, under the Act of August 24, 1912. Published Monthly.

Editor and General Manager,
OTTO U. KING, D.D.S., F.A.C.D., 127 N. Dearborn St., Chicago, Illinois.
Associate Editors,
THOMAS P. HINMAN, D.D.S., F.A.C.D., Atlanta, Ga.
HARVEY J. BURKHART, D.D.S., LL.D., F.A.C.D., Rochester, N. Y.
THOMAS B. HARTZELL, D.M.D., M.D., F.A.C.D., Minneapolis, Minn.

All expressions of opinion and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the National Dental Association, unless such statements or opinions have been adopted by vote of the Association.

MANUSCRIPTS: Manuscripts should be typewritten, double-spaced, and the original, not the carbon copy, submitted. We cannot promise to return unused manuscript and used manuscript is not returned. Requests for reprints should be made at the time of forwarding article. We reserve the right to accept or reject any manuscript for publication. Articles are accepted for publication on condition that they are contributed solely to this journal.

SUBSCRIPTION included in the annual membership dues.

SUBSCRIPTION, $2.00 a year, in advance, to non-members, living in all parts of the United States or its possessions. Canada, $2.75. Foreign countries, $3.00. Single copies, 25 cents.

ADVERTISEMENTS accepted only from reliable firms. Fraudulent and misleading advertisements barred.

IN CHANGES OF ADDRESS both the old and new address must be given.

JOURNALS are not sent beyond the subscription period.

VOL. 8 NOVEMBER, 1921 No. 11

Editorial Department

COMMERCIALIZING SCIENTIFIC KNOWLEDGE

It seems inconceivable that with our traditions and the splendid heritage that has come down to us from the earliest days of dental history there should have crept into our calling a species of commercialism that threatens to make havoc of our ideals, and drag our good name in the dust, and the amazing thing is that this tendency toward commercialism has made itself manifest among some of the best-known men in the profession.

It works out in this way: A man gains a reputation for doing certain things in an unusually clever manner. He may have specialized

in some department of dentistry till his name stands out as typical of the best there is in that line of effort. Naturally when the chairman of a program committee of a dental society—local or state—begins to cast about for material for his meeting he seeks out men of this type to appear on his program. And what does he find? Too frequently he finds that the man of note deliberately begins to bargain for a price to be set upon his services before the society! *A price upon scientific knowledge!* The immortal Harris, Hayden, Atkinson, Webb, Taft, Cushing, Miller, Black, and hundreds of other men of outstanding ability have given freely of their services that the profession might benefit and the people be better cared for. To what pass are we coming?

It is getting so that the price set by some of these men is so exorbitant that the dental society officials are finding it difficult to finance their meetings. Is this right? Should such a premium in dollars and cents be placed upon the dissemination of professional information?

By this it is not meant to convey the idea that a modest remuneration is not justified when a man leaves his practice and travels far and wide to attend meetings. He cannot live on enthusiasm alone, and it is perfectly proper for the society, if it wishes—and it usually does wish—to compensate him moderately for his time and expense. If he conducts a post-graduate course for a society lasting several days, he should, of course, be paid for it. But the basis of payment should be entirely different from that which has been the custom in the recent past. There should be no driving of bargains in matters of this kind—no profiteering—no haggling over amounts. The man who deliberately goes out to capitalize his professional knowledge is not worthy of the name of a professional man. It has been the pride and glory of dentistry that its foremost thinkers have gladly and generously devoted their energies to the advancement of their chosen calling, and cheerfully laid their scientific offerings on the altar of human welfare.

It has remained only for these later days to inject into the situation the idea of barter and trade, the idea of money—large amounts of money—for showing men how to prolong human life. As if it were not an honor to any man to be asked to appear before a dental society, and read a paper or give a clinic. Men do not often enough appreciate the compliment which is conveyed when a society expresses a desire to sit at their feet and learn of them. The holiest function of all is to be able to impart knowledge to others, and woe betide the man who debases this precious privilege by commercializing it, and dragging it into the dregs of sordid gain.

The best traditions of dentistry were not built in this way, and they will never be maintained unless there is a reform. Let the thinking men of the profession resolutely set their countenance against it, and the evil will soon be stamped out.

COMMERCIALISM IN DENTISTRY

Among the echoes following the meeting of the National Dental Association, resulting not from official debate but from informal or incidental discussion of things in general, comes one relating to commercialism.

There is no mistaking the underlying current of thought and feeling that has existed for some time past and which is growing steadily, against the apparent tendency toward commercializing the development of ideas in dental practice, which has in the last few years been making considerable headway in the West especially, where most anyone with a scheme, original or otherwise, or a bit of special technic for sale, seems to think a ready and easy market awaits him.

It is not the intention to criticize a man for desiring to create a revenue from his perfected knowledge or skill thru teaching others, but there is another and broader viewpoint of the matter which those who are anxious to impart instruction at a stipulated monetary consideration, only, seem to be blind to. There is no justifiable reason for fostering and encouraging the purely mercenary among our prominent clinicians and lecturers. If their ideas are not worthy enough and their feelings toward their chosen profession not broad enough to bring the fruits of private research and study before a regularly organized convention of professional brethren, with honor and distinction as the rewards of legitimate effort; if personal interest in high standards and scholarly advancement for the profession as a whole is not to be seen, except for a price, the chances are a hundred to one that they have nothing worth while to exhibit.

The "postgraduate meeting" as we know it in the West has been an excellent thing in many ways but the tendency to convert our regular society meetings into postgraduate classes, at so much per head, when every member of the organization is or should be eligible to "sit in" at every session during the entire time of the meeting and get value received for his regular dues is, as we look at it, a serious mistake and in the long run will do the organization no good.

When a member of a dental society shows enough interest and enthusiasm to dismiss business, close his office for a week to attend the meeting of his society, often held at a considerable distance from home,

that meeting in every department should be wide open to him, there should be no further fee extracted or expected from him. No private counter attraction should be allowed to absorb a single minute of the regular convention time.

If we are to have this postgraduate work with the additional fee and there is much of it that is worthy, why not make it a separate affair and run it entirely outside and distinct from the regular meetings of the dental society, where every clinic and lecture or exhibit should be held for the sole benefit of each and every member of the society in good standing, his dues constituting the only fee.

If, on the other hand, our society dues seem insufficient to support first class programs at our meetings and make them both interesting and instructive, why not raise them to that point? — *Northwest Journal of Dentistry* (Portland, Ore.)

THE DENTAL WELFARE FOUNDATION

What is it? It is a plan for the dissemination of useful information to the public on the subject of mouth hygiene. The idea originated at a meeting of the American Dental Trade Association at Hot Springs in June, 1921. At Milwaukee in August, 1921, it was brought to the attention of the National Dental Association. The Section on Mouth Hygiene and Preventive Dentistry unanimously endorsed the plan. It was also passed by the unanimous vote of the Board of Trustees, and referred by them to the House of Delegates. The House of Delegates passed it unanimously.

Dr. H. E. Friesell was president at the time this was presented, and he is today very enthusiastic in his approval of this plan of educating the people.

Dr. Thomas B. Hartzell, the present president has in a recent statement for publication given his unqualified endorsement. Dr. J. P. Buckley, the president-elect, has also approved of the plan and is cooperating in the movement. It will thus be seen that the best men in the National Dental Association are in favor of this educational campaign.

The details of the plan have been mailed to the members of the profession and they are doubtless familiar with them. In endorsing this movement the National Dental Association assumes no financial obligation whatever. If there is a deficit it will be paid by the American Dental Trade Association. At the same time the National Dental Association is given supervision thru its representative of all the matter that is sent out from the Foundation. Dr. Otto U. King, secretary of

the National Dental Association, has been appointed to represent the Association in this movement.

This educational campaign is to be operated entirely without profit to individuals or firms, and no advertising of any kind is to appear in connection with it. It would seem to be the most altruistic plan that has ever been devised, and it merely remains for the dental profession to get behind the movement and push it to the widest possible sphere of influence. It should no longer be charged that the profession is remiss in its duty when it comes to educating the laity on the significance and care of the teeth. The opportunity is here, and we trust that every loyal, self-sacrificing dentist will avail himself of the privilege of joining in this campaign to the end that the glad tidings of good teeth be carried to every hamlet in the land.

SUMMARY OF DENTAL WELFARE FOUNDATION FACTS

¶The Dental Welfare Foundation was presented to the National Dental Association at the Milwaukee meeting and approved.

¶The minutes of the Milwaukee session show that it received the unanimous vote of the section on Mouth Hygiene and Preventive Dentistry, of the Board of Trustees and of the House of Delegates. Every member of each of these bodies is equally responsible for the establishment of the Dental Welfare Foundation.

¶The Dental Welfare Foundation establishes a new organization in which organized dentistry and the Dental Trade Association are cooperating for altruistic purposes.

¶The National Dental Association instructed the council on Mouth Hygiene and Public Instruction to enter into a contract with the Dental Trade Association establishing the Dental Welfare Foundation.

¶The supreme authority of the National Dental Association is the House of Delegates and all officers and committeemen are creatures of it.

¶In view of this fact, the officers are under obligation to carry out the instruction of this supreme authority. The officers, however, have no other thought in mind than to keep inviolate the obligations of this contract and make their official report to the House of Delegates at the Los Angeles meeting, July 17-21, 1922.

¶The Association is relieved from all financial responsibilities. If a profit results, it will be used for educational purposes as authorized by the National Dental Association.

¶Briefly, the plan is to mail one of twelve Health Talks, printed

on postal cards, each month for one year, to a list of names furnished by individual members of the dental profession, dental supply depots, dental laboratories and dental manufacturers.

¶The General Secretary of the National Dental Association, Otto U. King, was officially appointed as the Association's representative in the Dental Welfare Foundation. Dr. King has approved every letter, all advertising copy and printed matter used by the Foundation.

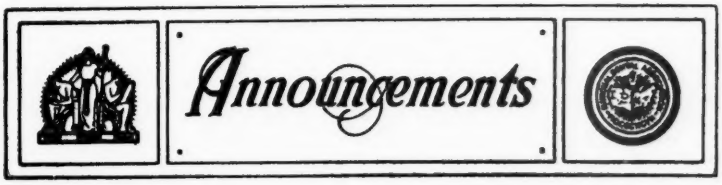
¶The Dental Welfare Foundation has the official indorsement of Past-President H. E. Friesell, President Thomas B. Hartzell, President-Elect John P. Buckley and W. R. Wright, chairman of the Council on Mouth Hygiene and Public Instruction.

¶"Live a little longer" will be the message to humanity.

DANGER OF PUBLIC HEALTH INSURANCE

It looks very much as tho the medical profession is digging its own grave. What else can we think when we find prominent members of the medical profession advocating compulsory health insurance, health centers, and free hospitals under state or federal control where medical and surgical treatment may be secured by anyone without money or without price, also venereal clinics, free or nearly so, and many other proposed medical uplift schemes, all tending to undermine the physician in private practice and eventually drive him out of business. It is about time to separate the sheep from the goats and know where we stand on this proposition of making the practice of medicine another one of those state functions which fail to functionate in the sense of giving something that is wortn while.

We dislike to think it, and yet developments at the Boston session of the American Medical Association indicate that we shall be obliged to fight public health officers, as a class, in connection with the attempt to force compulsory health insurance and state medicine upon us. Some of the health officers in attendance at the Boston session admitted that they were for state medicine, and that it was perfectly natural for health officers to support it as it meant a continuance of the official positions and salaries connected therewith. In view of the fact that in a large measure health officers owe their positions to the influence of the medical profession, it seems to us that they should be in better business than trying to foist state medicine upon us. It is time for a "show down" on this question of state medicine, and the sooner we find out who our friends are the better it will be for us and the more intelligently we can act.—*Journal of the Indiana State Medical Association.*



CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Institute of Dental Teachers, third week in January, 1922, at Montreal, Quebec. Abraham Hoffman, Secretary, 381 Linwood Avenue, Buffalo, N. Y.

STATE SOCIETIES

1921

November

Arizona, at Phoenix (10).

December

Hawaiian Islands, at Honolulu (2).
Ohio, at Columbus (6, 7, 8).

1922

February

Minnesota, at Minneapolis (22, 23, 24, 25).

March

Kansas, at Kansas City.
South Dakota, at Sioux Falls.
Vermont, at Rutland (15, 16, 17).

April

Alabama, at Birmingham (11, 12, 13).
Connecticut, at New Haven (20, 21, 22).
Kentucky, at Louisville (10, 11, 12).
Michigan, at Detroit.
Mississippi, at Meridian.
Missouri, at Kansas City.
West Virginia, at Fairmont (10, 11, 12).

May

Arkansas, at Little Rock.
Illinois, at Springfield (9, 10, 11).
Indiana, at Indianapolis (15, 16, 17, 18).
Iowa, at Des Moines (2, 3, 4).
Massachusetts, at Worcester (3, 4, 5).
Nebraska, at Lincoln.
North Dakota, at Fargo.
South Carolina, at Georgetown.

June

California (Southern), at Los Angeles.
Georgia, at Augusta (14, 15, 16).
North Carolina, at Wrightsville Beach.
Utah, at Salt Lake City (19-24).
Wyoming, at Sheridan (20, 21, 22).

July

Washington, at Seattle.
Wisconsin, at Milwaukee (11, 12, 13).

September

Delaware, at Wilmington (14).

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

California, at San Francisco, College of Physicians and Surgeons, December 10. C. A. Herrick, Secretary, 133 Geary Street, San Francisco.

Connecticut, at Hartford, November 17, 18, 19. Robert H. W. Strang, Recorder, 886 Main Street, Bridgeport.

Iowa, at Iowa City, College of Dentistry, December 5. C. B. Miller, Secretary, 726 Fleming Building, Des Moines.

Kansas, at Wichita, December 12. G. F Ambrose, Secretary, El Dorado.

Maryland, at Baltimore, College of Dental Surgery, November 9, 10, 11. F. F. Drew, Secretary, 701 N. Howard Street, Baltimore.

Michigan, at Ann Arbor, November 14. E. O. Gillespie, 745 David Whitney Building, Detroit.

Nebraska, at Omaha, in the Creigton Dental College, November 8, 9, 10, 11, 12, 1921. H. H. Antles, Secretary, Lincoln.

New Jersey, at Trenton, December 5-9. John C. Forsyth, Secretary, 429 E. State Street, Trenton.

North Carolina, at Raleigh, January 12, 1922. F. L. Hunt, Secretary, Asheville.

Oklahoma, at Oklahoma City, Senate Chamber at the State Capitol, December 19-24, 1921. J. M. Doss, Secretary, Oklahoma City.

Rhode Island, at Providence, in the State

House, November 15, 16, and 17, 1921. Albert M. Midgley, Secretary, 315 Butler Exchange Building, Providence.

South Dakota, at Sioux Falls, January 9, 10, 11, 12, 1922. L. R. Walston, Secretary, Redfield.

OHIO STATE DENTAL SOCIETY

The fifty-sixth annual meeting of the Ohio State Dental Society will be held in Memorial Hall, Columbus, December 6, 7, and 8, 1921.

An exceptionally good and diversified program will be presented to which all members of other state societies are cordially invited.

F. R. CHAPMAN, *Secretary*
305 Schultz Bldg., Columbus, Ohio

MINNESOTA STATE DENTAL ASSOCIATION

The annual meeting of the Minnesota State Dental Association will be held at the Minneapolis Armory, February 22 to 25, 1922.

C. H. TURNQUIST, *Secretary*
338 LaSalle Bldg., Minneapolis, Minn.

SOUTHWEST MISSOURI DISTRICT DENTAL SOCIETY

The Southwest Missouri District Dental Society will have a three day program December 12, 13, and 14, at Joplin. Willis Coston, of Topeka, Kansas, George B. Winter of St. Louis, Missouri, and Edouard M. Hall, of Kansas City, Missouri, will appear on this program.

All ethical practitioners are cordially invited to attend.

W. W. BROWNE, *Secretary*,
Joplin, Mo.

BOARD OF DENTAL EXAMINERS OF CALIFORNIA

The next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry and as a dental hygienist in this state will be held in the city of San Francisco, beginning at the College of Physicians and Surgeons on December 10, 1921. Applicants for examination for a license to practice dentistry should file on November 26 the following credentials: (1) a diploma from a dental college approved by this Board; (2) a diploma from an accredited high school or a certificate signed by a state superintendent of public instruction (or similar officer) to the effect that such applicant has had scholastic preparation equivalent in all respects to that demanded for graduation from a high school giving a four-year course of instruction in the state from which such certificate is issued. A certificate signed by a deputy superintendent or an examiner for entrance to a dental college or other school will not be accepted by the Board; (3) a satisfactory testimonial of moral character under the signature and seal of either a dean of a dental college, secretary of a board of dental examiners, or secretary of a dental association; (4) a recent unmounted photograph of the applicant. If an applicant has been a duly licensed practitioner of dentistry of some other state of the United States for a period of at least five years, he shall file such license or licenses which will be accepted in lieu of the certificate of graduation from a high school or its equivalent.

Applicants to examination for a license to practice as a dental hygienist should file on November 26 the following credentials: (1) a diploma or certificate from a legally incorporated dental college, dental infirmary or any other institution of equal standing which maintains a course of instruction for dental hygienists equivalent in all respects to similar courses of instruction maintained at the University of California; (2) a testimonial of moral character signed by the dean of the institution from which such applicant graduated, or a secretary of a state board of dental examiners of the state in which such applicant is licensed; (3) a recent unmounted photograph of the applicant.

C. A. HERRICK, *Secretary*
133 Geary St., San Francisco, Cal.

NORTH CAROLINA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the North Carolina State Board of Dental Examiners will be held at Raleigh, North Carolina, beginning promptly at nine o'clock, on Thursday morning, January 12, 1922.

For further information and application blank, address

F. L. HUNT, *Secretary*
Asheville, N. C.

SOUTH DAKOTA STATE BOARD OF DENTAL EXAMINERS

The next examination of the South Dakota State Board of Dental Examiners will be held in Sioux Falls, South Dakota, January 9, 10, 11, and 12, 1922. All applications must be in the hands of the secretary by January 1, 1922. For further information and application blanks, address

L. R. WALSTON, *Secretary*
Redfield, S. D.

NEBRASKA STATE BOARD OF DENTAL EXAMINERS

The Nebraska State Board of Dental Examiners will hold its next regular examination in the Creighton Dental College, Omaha, Nebraska, November 8, 9, 10, 11, and 12, 1921. For information and applications address

H. H. ANTLES, *Secretary*
Department of Public Welfare, Lincoln, Neb.

OKLAHOMA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the Oklahoma State Board of Dental Examiners will be held in the Senate Chamber at the State Capitol, Oklahoma City, Oklahoma, December 19 to 24, 1921.

L. M. DOSS, *Secretary*
Oklahoma City, Okla.

RHODE ISLAND BOARD OF REGISTRATION IN DENTISTRY

The regular semiannual meeting of the Rhode Island Board of Registration in Dentistry for the examination of applicants will be held in the State House, Providence, Rhode Island, November 15, 16 and 17, 1921. All applications with proper fee must be filed one week previous. For further information address,

ALBERT L. MIDGLEY, *Secretary*
315 Butler Exchange, Providence, R. I.

DENTAL PROTECTIVE ASSOCIATION OF THE UNITED STATES

The annual meeting of the Dental Protective Association of the United States will be held at the Palmer House, State and Monroe Streets, Chicago, Illinois, Monday, December 19, at 4:00 P. M. sharp. The report of the officers will be given; a board of directors will be elected and such other business transactions as should come before the association. All members are urgently requested to be present.

E. W. ELLIOT, *Secretary*,
39 S. State St., Chicago, Ill.

AMERICAN SOCIETY OF DENTAL RADIOGRAPHERS.

The American Society of Dental Radiographers was organized at the meeting of the National Dental Association, at Milwaukee.

Its purpose is purely educational and is open to members in good standing in their component, state and national societies.

The following officers were elected for the ensuing year: H. C. McKittrick, president, Indianapolis, Ind.; J. H. Prothero, vice-president, Chicago, Ill.; Martin Dewey, secretary-treasurer, New York, N. Y.

The following men were present and became charter members at the organization meeting: H. C. McKittrick, Indianapolis, Ind.; Fredrick F. Molt, Chicago, Ill.; William H. Thwaites, Grand Rapids, Mich.; Charles W. Cuthbertson, Washington, D. C.; F. W. Hergot, Seattle, Wash.; C. A. Barnhill, Indianapolis, Ind.; C. H. Dodge, Chicago, Ill.; Oscar T. Dean, Seattle, Wash.; R. Boyd Bogle, Nashville, Tenn.; Charles F. Chandler, Montgomery, Ala.; John A. Stoeckley, South Bend, Ind.; George M. Byrne, Lincoln, Neb.; Charles W. Lockey, Birmingham, Ala.; L. A. Meyers, Oconomowoc, Wis.; James H. Dolittle, Cleveland, Ohio; R. J. Dixon, Madison, Wis.; William W. Gibson, Grand Rapids, Mich.; Albert L. Midgley, Providence, R. I.; Lucien H. Arnold, Chicago, Ill.; E. W. King, Genesee, Wis.; Ben H. Sherrard, Rock Island, Ill.; Harry K. Pratt, Appleton, Wis.; Luther M. Moore, Appleton, Wis.; N. L. Slaughter, Athens, Ga.; Raymond J. Wenker, Milwaukee, Wis.; T. L. Stickney, Crookston, Minn.; C. L. Powers, Memphis, Tenn.; H. A. Hinaman, Urbana, Ill.; J. D. McAlpin, San Francisco, Cal.; B. F. Gray, San Francisco, Cal.; C. U. Hillweg, Chicago, Ill.; J. C. Dean, San Francisco, Cal.; Francis H. Dean, Worcester, Mass.; Delos Hill, Atlanta, Ga.; John J. Gary, Oskosh, Wis.; A. W. Johnson, Minneapolis, Minn.; B. P. Wirbitski, Silver Lake, Minn.; Charles J. Miller, Chippewa Falls, Wis.; B. J. Haley, Chippewa Falls, Wis.; B. P. Baus, St. Cloud, Wis.; Z. W. Moss, Dixon, Ill.; John D. Jordon, Little Rock, Ark.; Harry B. Johnston, Atlanta, Ga.; Leonard E. Trinkle, Terre Haute, Ind.; J. H. Prothero, Chicago, Ill.; Edmund Kells, New Orleans, La.; George Brady, St. Louis, Mo.; Martin Dewey, New York, N. Y.

The next meeting will be held in Chicago, at the time of the Chicago Dental Meeting, January, to arrange for the next annual meeting at the time of the National Dental Association in Los Angeles, July 17-21, 1922.

DENTAL CORPS ORDERS FROM WAR DEPARTMENT

NAVY

Lieutenant Commander E. H. Tennent, to naval hospital, League Island, Pa.

Lieutenant Hyman Mann, Connecticut; to Minnesota.

Lieutenant Commander E. W. Lacy, Florida; to naval medical supply depot, Brooklyn.

Lieutenant Commander M. W. Mangold,

naval medical supply depot, Brooklyn; to Florida.

Lieutenant Commander F. S. Tichy, naval training station, Great Lakes, Ill.; to Asiatic station.

Lieutenant William J. Rogers, naval training station, Newport, R. I.; to duty naval hospital, Boston.

Lieutenant (J. G.) Francis Ulen, Shanghai; to duty under patrol commander.—*Army and Navy Register,* October 1, 1921.

Lieutenant H. R. McCleary, marine expeditionary force, Haiti; to home, wait orders.

Lieutenant J. F. McGrath, naval training station, Newport, R. I.; to naval hospital, Chelsea, Mass.

Lieutenant (J. G.) J. A. Turrentine, naval air station, Rockaway Beach; to R. S., New York.

Lieutenant H. S. Hursh, retired; to home.

The following promotions in the Navy are announced: To be passed assistant surgeons with rank of lieutenant: Jules Magnette, Jr., Howell C. Johnson, Edward J. Goodbody, Charles G. Terrell and John G. Smith.—*Army and Navy Register,* October 8, 1921.

Lieutenant (J. G.) R. R. Craes, navy yard, Mare Island; to Melville.

Lieutenant W. H. Wood, North Dakota; to R. S., Boston.

Lieutenant E. J. Noonan, naval training station, Great Lakes, Ill.; to marine E. F., Port-au-Prince, Haiti.

Lieutenant E. C. O'Connell, navy yard, Mare Island; to destroyer squadrons. Pacific fleet.

Lieutenant H. J. LaSalle, Melville; to 16th naval district.

Lieutenant (J. G.) R. D. Reid, naval hospital, Fort Lyon; to 16th naval district.—*Army and Navy Register,* October 15, 1921.

Lieutenant Thomas White, Michigan; to Savannah.

Lieutenant Commander L. C. Williams, New Mexica; to Alert.

Lieutenant N. S. Duggan, Alert; to New Mexico.

The following promotions in the Navy are announced: Eugene H. Tennent dental surgeon, lieutenant commander, from May 11, 1921; Theodore P. Donahoe, passed assistant dental surgeon, lieutenant, from August 3, 1920.—*Army and Navy Register,* October 22, 1921.

Army

Lieutenant Colonel Samuel H. Leslie from duty at Camp Pike, Ark., to Fort Sill, Okla., for duty.

Major Brantley I. Newsom will report by telegraph to commanding general 8th corps area for assignment to duty and station.

Major Lester C. Ogg is detailed as professor of military science and tactics at dental school, Ohio State University, Columbus, in addition to his other duties.

Major Eugene Milburn relieved from duty with 11th Infantry upon its arrival at Camp Knox, Ky., and report by telegraph to commander general 8th corps area for assignment to duty and station.

Major Harry C. Peavey, Captain Thomas H. Veale from duty at Camp Devens, Mass., and will report by letter to commanding general 1st corps area for assignment to duty and station.

Captain Walter A. Rose to Jefferson Barracks, Mo., for duty.

Captain Robert E. Motley from Camp Pike, Ark., to Army and Navy General Hospital, Hot Springs, Ark., for observation and treatment.

Captain Clyde W. Allen from duty at Camp Sherman, Ohio, to Columbus Barracks, Ohio, for duty.

Captain Roy A. Stout to Hawaiian Islands about December 6 instead of November 12, as previously ordered.—*Army and Navy Register,* October 1, 1921.

Lieutenant Colonel Raymond E. Ingalls from duty at Fort Snelling, Minn., to Carlisle Barracks, Pa., medical field service school for temporary duty for purpose of obtaining special instruction at that school and thence to Walter Reed General Hospital, D. C., for duty.

Major Jacob L. Brause from duties at Camp Meade, Md., and will report by letter to commanding general 3d corps area, Fort Howard, Md., for assignment to duty and station.

Majors John M. Evey, Oscar P. Snyder are relieved from duties at Camp Grant, Ill., and will report by letter to commanding general 6th corps area, Fort Sheridan, Ill., for assignment to duty and station.

The following promotions in the Regular Army are announced: To be captains: Clarence W. Johnson, from August 7, 1921; Egbert W. van D. Cowan, from September 3, 1921; Frank W. Small, from September 5, 1921; Arthur E. Brown, from September 8, 1921; Lemuel P. Woolston, from September 14, 1921; Robert C. Craven, from September 18, 1921; Rollo Lown, from September 19, 1921, and Melville A. Sanderson, from September 19, 1921, Edward J. Kubesh, Frank A. Crane and Arne Sorum.—*Army and Navy Register,* October 8, 1921.

Lieutenant Colonel Rex H. Rhoades, now on duty as assistant to surgeon 6th corps area, Fort Sheridan, Ill., is detailed, in addition to his present duties, as professor of

military science and tactics at Northwestern University dental school, Chicago.—*Army and Navy Register,* October 15, 1921.

Resignation by Captain Harold J. Parker is accepted.

First Lieutenant Victor L. Shepard is honorably discharged with one year's pay.

The following promotions in the Regular Army are announced: To be captains: Earl G. Gebhardt from September 20, 1921; Alvin D. Dannheisser from October 4, 1918.—*Army and Navy Register,* October 22, 1921.

Applicants who have accepted appointments in Dental Reserve Corps: Captain J. B. Eastman, New Haven, Conn.; Captain W. G. Crosby, Seattle, Wash.; Captain C. T. Brann, Knoxville, Tenn.; Captain C. Q. Kratz, DeWitt, Iowa; Captain I. P. Carr, Florence, S. C.; Captain F. P. Meany, Austin, Minn.

PATENTS OF INTEREST TO DENTISTS

1382135, Collapsible tube and container for the same, Benjamin E. D. Stafford, Pittsburgh, Pa.

1382134, Container for collapsible tubes, Benjamin E. D. Stafford, Pittsburgh, Pa.

1382136, Combined collapsible tube and container therefor, Benjamin E. D. Stafford, Pittsburgh, Pa.

1382137, Collapsible tube and container for the same, Benjamin E. D. Stafford, Pittsburgh, Pa.

1382138, Dispensing tube or box, Benjamin E. D. Stafford, Pittsburgh, Pa.

1382139, Collapsible tube and container for the same, Benjamin E. D. Stafford, Pittsburgh, Pa.

1382140, Collapsible dispensing tube and container, Benjamin E. D. Stafford, Pittsburgh, Pa.

1382587, Toothbrush, Robert M. Withycombe, Penhurst, Australia.

1382401, Dental instrument, Daniel A. Zurbrigg, Milford, Del.

1382830, Form of artificial tooth and means or method of anchoring same into position in the mouth, Edwin A. Hagaman, Madelia, Minn.

1382661, Shade-holder for lighting fixtures, Earle C. McKinnie, Chicago, Ill.

1383141, Closing guide for collapsible tubes, George H. Neidlinger, East Orange, N. J.

1383029, Combination backing and post for artificial anterior teeth, Hugo Schick, St. Louis, Mo.

1383030, Combination backing and post for artificial anterior teeth, Hugo Schick, St. Louis, Mo.

1382681, Toothbrush, Samuel Segal, New York, N. Y.

58216, Design, cabinet for an X-ray unit, George B. Coleman, San Francisco, Cal.

1383696, Artificial tooth, Arthur N. Davis, New York, N. Y.

1384717, False teeth attachment, Benjamin Elisberg, New York, and W. Sheff, Brooklyn, N. Y.

1384143, X-ray apparatus, William Meyer, Chicago, Ill.

1384144, X-ray apparatus, William Meyer, Chicago, Ill.

1384282, Artificial tooth, Clarence E. Tuttle, Readville, Mass.

1384740, Dental instrument, William W. Bolls, Washington, D. C.

1384936, Toothbrush, James H. Bowman, Honolulu, Hawaii.

1384975, Dental engine hand tool, William G. Shelton, New York, N. Y.

1384863, Mercury ointment, John P. Shepherd, Chicago, Ill.

1384869, Bridge tooth, Lake H. Sprinkle, Brooklyn, N. Y.

1385288, Toothpick holder, George W. Walker, Oakland, Cal.

58445, Design, toothbrush, Percy S. Marcellus, Orange, N. J.

1385812, Supporting device for false teeth. Fred A. Binns, Addison, Mich.

1385781, Electrically operated centrifugal casting machine, Harold G. Eynon, Philadelphia, Pa.

1385747, Dental tool, William A. Kelsey, Minneapolis, Minn.

1385505, Impression tray, Samuel Supplee, East Orange, N. J.

1385767, Combined toothbrush and paste container, Adolf Widmaier, Atlanta, Ga.

1386398, Sanitary wrapper for toothbrush bodies, Lawrence C. Davis, Chicago, Ill.

1386463, Diatoric or pinless tooth, Joseph B. Foster, Roanoke, Va.

1386252, Dentifrice, William T. Green, Summit, N. J.

1386193, Apparatus for dispensing dental materials, Charles W. Meguiar, Sonora, Ky.

1386436, Dental pliers, William C. Smith, Milford, Del.

1386288, Dental surgical instrument, James H. Taylor, Owensboro, Ky.

1386289, Dental surgical instrument, James H. Taylor, Owensboro, Ky.

58533, Design, surgical mirror, Alexander A. Anzell, New York, N. Y.

58540, Design, sterilizer, Manuel Blickman, New York, N. Y.

58653, Design, toothpick vender, Miles Wilson, Canastota, N. Y.

1386762, Artificial tooth, Walter H. Bowman, Philadelphia, Pa.

1387053, Dental equipment stand, George D. Heck, Prince Bay, N. Y.

1386798, Artificial tooth, Russell J. Park, St. Louis, Mo.

1386966, Attachment for toothpaste tubes, Harry S. Slade, McKeesport, Pa.

1387434, Blowpipe, George L. Walker, New York, N. Y.

1387435, Blowpipe, George L. Walker, New York, N. Y.

58668-9, Design, combined tooth-cleaner and support, Louis A. Gable, Harrisburg, Pa.

1387591, Blowpipe burner, William J. Cooper, Smethwick, England.

1387770, Dental mirror, Harry S. Dolbey, Providence, R. I.

1387540, Technical anatomical dental mold, F. G. Hawksworth, Westmont, N. J., and J. H. Eklof, Lansdowne, Pa.

1387541, Dental chair jack, Donald C. Hayden, Bridgeport, Conn.

1387647, Anesthetizing machine, J. A. Heidbrink, Minneapolis, Minn.

1387488, File record and mount for X-ray negatives, O. A. Helmer, New York, N. Y.

1387558, Sprue former, Elling I. Rosheim, Roland, Iowa.

1388074, Rotary toothbrush, Charles H. Stone, Freeport, Ill.

1388421, Throat and mouth gag, Lyman R. Forgrave, St. Joseph, Mo.

1388573, Anesthetic compound, Oliver Kamm, and E. H. Volwiler, Chicago, Ill.

1388347, Dentist's cabinet, Rudolf Kicka, Pittsburgh, Pa.

1388584, Arch-bridge construction, J. B. Marsh, Des Moines, Iowa.

1388526, Hot-air syringe, O. H. and A. F. Pieper, Rochester, N. Y.

1388527, Ionization current regulator, O. H. and A. F. Pieper, Rochester, N. Y.

1388312, Saliva ejector, Carl H. Seeger, Manitowoc, Wis.

1388617, Handpiece for dental engines, Rufus G. Stanbrough, New York, N. Y.

1389030, Artificial tooth, Hiram O. Cowdrick, Philadelphia, Pa.

1388946, Hypodermic syringe, Luella L. Goold, Arlington, Mass.

1388947, Combination dental film-mount and diagnosis sheet, L. N. Halpern and L. Goldstein, New York, N. Y.

1389064, Dental floss holder, Oliver O. Martin, Chicago, Ill.

1389452, Squeezer for collapsible tubes, Thomas H. Martin, Columbus, Ohio.

1389022, Tooth-form finder, Frank M. Wadsworth, Minneapolis, Minn.

1389084, Non-conducting plastic composition or cement known as plastic enamel, Lawson B. Wilson, Washington, D. C.

58819, Design, dental appliance panel, O. H. and A. F. Pieper, Rochester, N. Y.

Copies of above patents may be obtained for twenty-five cents each, by addressing John A. Saul, Solicitor of Patents, Fendall Building, Washington, D. C.